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DEPARTMENT OF AGRICULTURE.

MISCELLANEOUS. SPECIAL REPORT No. 3.

MISSISSIPPI:

ITS

CLIMATE, SOIL, PRODUCTIONS,

AND

AGRICULTURAL CAPABILITIES.

By A. B. HURT,

SPECIAL AGENT.

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AGRICULTURE IN MISSISSIPPI.

By A. B. Hurt.

Mississippi is essentially and pre-eminently an agricultural State. Nature designed and fashioned it to bless and reward the labors of the husbandman. Its recent geological formations appear to exclude it from the profits of the mine and quarry, and as yet it cannot be classed among the great manufacturing States.

What the State lacks, however, in mineral resources, sometimes transitory, and always in the end exhaustive, is more than counterbalanced by a generous, responsive soil, an almost ideal climate, and productions the value and variety of which are not excelled in any part of the Union.

The first Europeans who trod its soil—the adventurous and romantic expedition of Hernando De Soto—found its surface richly carpeted with the native grasses, and maize or Indian corn, one of the chief foods of mankind, "of such luxuriant growth as to produce three or four ears to the stalk." No State in the Union has been more liberally endowed by nature with all the conditions favorable to agriculture, and that it possesses the requisites for great manufactures, to consume and put into marketable shape its varied products of raw material, is now no longer a matter of experiment.

In one sense of the word Mississippi is still a new State, with its immense natural advantages as yet mainly unappropriated. Its great forests of valuable woods have been comparatively little depleted; many of its numerous fine mill and manufacturing sites await the power of skill and capital; more than one-half of its area remains untouched by the husbandman, while the part already in cultivation may be made to double its productive power by improved methods of agriculture.

The importance of agriculture to the people of Mississippi may be better appreciated when it is remembered that 339,938, or more than 81 per cent. of its entire working population, are engaged in agricultural pursuits. The distribution is as follows:

All occupations	415,506
Agricultural laborers	215,472
Farmers and planters	123,382
Gardeners, nurserymen and vine-growers	620
Stock raisers, drovers, and herders	93
Turpentine farmers and laborers	248
Others in agriculture	123
Total	339,938

From the time when the first European settlement was established at the Bay of Biloxi, in 1699, a variety of causes have intervened to retard that systematic, thorough, intensive cultivation of the soil, in connection with a variety of products which are required to develop to their full extent the natural advantages of an agricultural country. The system of agriculture which obtained in this State prior to the emancipation of the slaves was not conducive to this end. It was an era of large estates, devoted almost exclusively to a single product, and this not with the idea to obtain the greatest results from a given area of land.

Under the new order of things, after the civil war, the farmers of Mississippi found themselves without capital with which to cultivate their lands—the only species of property, save a remnant of their stock, left to them. Millions of dollars' worth of their property had been swept away, and thus impoverished they were compelled to invoke the yoke of debt, backed in many cases by mortgages on real estate, from which they are not yet entirely free.

The system of large planting was quite extensively resumed after the war. Advances of supplies and money to make the crops were usually obtained from the local merchant, reaching the farmer after having passed through the hands of several middlemen, and compelling him to pay to them very liberal, not to say exorbitant, profits and rates of interest. The end of the year frequently found the farmer unable to meet his obligations for supplies obtained upon these terms, and in this way many fine estates were sacrificed under foreclosure of deeds of trust. Probably no other country except that of cotton production could have withstood and even slowly prospered under these adverse circumstances.

The agriculture of Mississippi has run the course common to most States—improvident, careless farming on rich lands, exhaustion and restoration. It is now the period of restoration, and while the State has an abundance of fertile land remaining yet untouched, a great deal is being accomplished by the improvement of lands which have been heretofore impoverished by previous careless agriculture.

There has been a marked improvement in the methods of culture, the treatment of the soil, and the diversification of crops within the past few years. A very encouraging advance has been made in agricultural methods, but much remains yet to be done to bring the State up to that high degree of agricultural prosperity which nature seems to have designed for its people to enjoy. New ideas are happily taking hold of the people. The obsolete agencies of the slave period have been discarded for methods better suited to the new *régime*. Improved implements, intensive cultivation, diversification of crops, fine stock, fruit and vegetable production, are the means which are quietly effecting a revolution in agriculture. The progress has been especially rapid in the past four years; lands have advanced in value, and there is a hopeful, cheerful, contented feeling abroad in the State.

SMALL FARMS IN MISSISSIPPI.

One of the most encouraging features in the agriculture of Mississippi is that the large plantations are being gradually subdivided into smaller holdings. As before remarked, the system prior to the close of the late war was one of large estates, and there was a strong tendency among slave-owners to enlarge annually the size of their plantations with the increase of slaves. To-day, just the contrary policy is pursued; the tendency is to contract the size of the larger plantations, intensify and improve the cultivation, and generally to obtain the highest results from a given area of land. The individual cultivation of fewer acres by improved methods is now the popular idea. The statistics of the census show that the progress in this direction is quite marked, a fact that will be gratifying to those who believe that the agricultural prosperity of the State and the value of lands will be increased by the subdivision of large plantations, and the acquisition of homesteads by an intelligent and industrious class of immigrants. In 1860 there were in Mississippi 42,840 farms; in 1870 there were 68,023 farms; and in 1880, 101,772 farms.

During the decade from 1850 to 1860 the number of farms increased 26 per cent., and from 1870 to 1880 the increase was within a fraction of 50 per cent.; from 1860 to 1880 the number of farms increased 116 per cent.

The increase in the number of farms in Mississippi will be more readily appreciated by the following comparative table:

States.	Farms, 1870.	Farms, 1880.	Increase.
	Number.	*Number.*	*Per cent.*
Massachusetts	26,500	38,406	45
New York	216,253	241,058	11
New Jersey	30,652	34,307	12
Indiana	161,289	194,013	20
Kentucky	118,422	166,453	40
Mississippi	68,023	101,772	50

The distribution of the gross number of farms by classes according to acreage, was 84 farms under 3 acres; 2,336 of 3 and under 10 acres; 11,936 of 10 and under 20 acres; 26,836 of 20 and under 50 acres; 19,318 of 50 and under 100 acres; 35,493 of 100 and under 500 acres; 3,936 of 500 and under 1,000 acres, and 1,883 of 1,000 acres and over.

The reduction in the average size of farms has been gradually increased, and with this change there has been better cultivation and more satisfactory results. The following statement illustrates the increasing popularity of small farms:

Year.	Farms.	Total lands in farms.	Improved lands in farms.	Average size of farms.
	Number.	*Acres.*	*Acres.*	*Acres.*
1850	33,960	10,490,419	3,444,358	309
1860	42,840	15,839,684	5,065,755	370
1870	68,023	13,121,113	4,207,146	193
1880	101,772	15,855,462	5,216,937	156

From the above it appears that the average size of farms is not as large in 1880 as in 1860 by 214 acres, and not as large in 1880 as in 1870 by 37 acres. It will also be observed that the total number of acres of improved land was greater in 1880 than in 1860, a very prosperous period in the State's history, and greater in 1880 than in 1870 by 1,007,791 acres. The foregoing facts show clearly a tendency to small farms in Mississippi, a result that will be rapidly accomplished as a thrifty and industrious class of immigrants—which the State cordially invites—find homes on lands now idle and non-productive.

VALUE OF PRODUCTS.

The figures of the last census reveal a gratifying progress made by the State in material development during the last decade. The increase in the production of various crops affords an excellent idea of the State's advancement from 1870 to 1880, as illustrated by the following table:

Products.		1870.	1880.
Indian corn	bushels	15,637,316	21,340,800
Cotton	bales	564,938	963,111
Oats	bushels	414,586	1,959,620
Wheat	do	274,479	218,890
Hay	tons	8,324	8,894
Molasses	gallons	219,674	536,625
Rice	pounds	374,627	1,718,951
Irish potatoes	bushels	214,189	303,821
Sweet potatoes	do	1,743,432	3,610,660
Tobacco	pounds	61,012	414,663
Orchard products	value	$71,018	$378,145
Live stock	number	1,724,295	2,398,934
Butter	pounds	2,613,521	7,454,657
Wool	pounds	288,285	734,643

It thus appears that from 1870 to 1880 the production of Indian corn in Mississippi increased 36 per cent. The production of cotton increased 70 per cent. The oat product increased to the large extent of 1,535,034 bushels. The molasses product increased 144 per cent. Live stock increased 38 per cent. The production of rice was nearly five times as great in 1880 as in 1870; the production of tobacco was nearly seven times as great; the value of orchard products was more than five times as great, while there was a large increase in wool, butter, cheese, and other products.

These figures show a rapid advancement, not only in the production of cotton, but also in food products, and at a rate considerably in advance of the increase in population. The increase in products as compared with the increase in population will be better appreciated when taken in connection with the statistics of other States:

States.	Population, 1870.	Population, 1880.	Per cent. increase.
New York	4,382,759	5,082,871	15
Pennsylvania	3,521,951	4,282,891	21
Virginia	1,225,163	1,512,565	23
Kentucky	1,321,011	1,648,690	24
Mississippi	827,922	1,131,597	36

The same States increased their production of grain as follows:

States.	1870.	1880.	Increase.
	Bushels.	*Bushels.*	*Per cent.*
New York	77, 761, 688	89, 926, 704	15
Pennsylvania	97, 492, 934	106, 840, 422	9
Virginia	32, 540, 244	42, 737, 004	31
Kentucky	63, 700, 675	89, 953, 432	41
Mississippi	16, 346, 925	23, 524, 792	43

Live stock increased in the same States as follows:

States.	1870.	1880.	Increase.
	Number.	*Number.*	*Per cent.*
New York	5, 286, 421	5, 422, 238	2
Pennsylvania	4, 484, 748	5, 251, 304	17
Virginia	1, 736, 360	2, 392, 360	37
Kentucky	3, 891, 538	4, 558, 089	17
Mississippi	1, 724, 295	2, 398, 934	38

The estimated value of all farm products in Mississippi sold, consumed, or on hand in 1879 was $63,701,844, or an average of $56 for each unit of population.

The value of the cotton product alone amounted to $43,339,995—nearly $40 for each unit of population. Compared with her sister Southern States, Mississippi makes a fine showing as to the average cash value per acre of the cereals, potatoes, tobacco, and hay of the farm. (Department of Agriculture Report, 1881–'82.)

Table showing the average cash value per acre of the cereals, potatoes, tobacco, and hay of the farm taken together for the year 1881.

	Average value per acre.
North Carolina	$9 84
South Carolina	7 62
Georgia	8 37
Florida	8 72
Alabama	9 68
Tennessee	9 38
Mississippi	10 49

The yield of lint cotton per acre in the same States in the year 1882 (lb.) was as follows:

	Pounds per acre.
North Carolina	180
South Carolina	183
Georgia	152
Florida	117
Alabama	150
Tennessee	170
Mississippi	190

The value of lands per acre in Mississippi as compared with the value of products per acre, according to the returns of the census, afford an interesting study. It often happens that lands which rent for from $5 to $10 per acre and yield products in value from $15 to $40 per acre, are rated in market as low as $10 and $25 per acre.

A comparison of the average price of lands per acre and average value of products per acre in Mississippi, with like statistics in some of the Western States, is given below:

Mississippi:

Improved land	acres..	5,216,937
Value of farms		$92,844,915
Value of farm products		$63,701,844

Average value of lands per acre, $17.79.
Average crop value per acre, $12.21.

Illinois:

Improved land	acres..	26,115,154
Value of farms		$1,009,594,580
Value of farm products		$203,980,137

Average value of lands per acre, $38.65.
Average crop value per acre, $7.81.

Indiana:

Improved land	acres..	13,933,738
Value of farms		$635,236,111
Value of farm products		$114,707,082

Average value of lands per acre, $45.66.
Average crop value per acre, $8.23.

Iowa:

Improved land	19,866,541
Value of farms	$567,430,227
Value of farm products	$136,103,473

Average value of land per acre, $23.52.
Average crop value per acre, $6.85.

It appears from the above that the price of lands, or their market value, in Mississippi, bears no just proportion to their real intrinsic value. Lands that will average a money value product of $12.21 per acre should average a market value of at least $50 per acre, especially in such a temperate, healthy climate. Without discussing the cause of the low price of lands, it may be remarked that there is too much land for the population and capital. Land is plentiful, easy to obtain, and therefore cheap. If Mississippi could double or treble its population by the addition of thrifty, industrious immigrants, possessed of some capital, the price of lands would no doubt increase to something like their real value. This is now being accomplished, and it is stated on the authority of the State commissioner of immigration that lands have advanced from 50 to 100 per cent. in the past two years.

It is to be regretted that the State has so little statistical data to illustrate in detail the progress made since the last census. Unfortunately, there is no statistical bureau in Mississippi. This progress has been substantial and gratifying, and it has undoubtedly been as great within the past four years as in the entire decade covered by the last census.

Railroad construction has advanced with unusual activity. A road from New Orleans to Meridian, through the valuable forests of yellow pine, has just been completed. The Natchez, Jackson and Columbus

Railroad has been finished to Jackson. The Illinois Central Railroad will soon have in operation a line from Kosciusko to Aberdeen, and one from Jackson to Yazoo City. An extension of the Chesapeake and Ohio system from Memphis to New Orleans, through the heart of the fertile Mississippi bottom, will be completed in a few months. Besides these, other lines are now in process of construction, while the prospect is good for the early completion of still other important chartered roads. Oil-mills and various manufacturing industries are being erected in different sections of the State.

In addition to a large list of lands sold by the State, the cash sales at the United States land office from January 1 to November 1, 1883, amounted to $395,007.52, and the number of homesteads acquired during the same time amounted to 65,341 acres. These sales and homesteads were chiefly made in the southern or pine counties. The assessed value of realty and personalty in Mississippi in 1879 amounted to $106,594,708; in 1883 it footed up in round numbers $127,000,000, an increase in the four years of $21,000,000. These figures do not properly show the extent of the increase in values, for no account is taken of the large sums invested in agricultural implements, and in industrial, manufacturing, and railroad enterprises, the property of which is exempt from taxation for ten years.

PHYSICO-GEOGRAPHICAL AND AGRICULTURAL FEATURES.

Mississippi lies between the thirty-first and thirty-fifth parallels of north latitude. The Mississippi and Pearl Rivers together mark its entire western boundary; on the east it is bounded by Alabama, on the north by Tennessee, and on the south by Louisiana and the Gulf of Mexico.

The area of the State has been variously given at from 45,000 to 55,000 square miles. Its true area, as computed at the last census, is put down as 46,340 square miles. The State is well supplied with water-courses and drainage. On the west the Mississippi River and its large tributaries in the State drain the great Yazoo delta and the hilly country adjacent thereto, while on the east the Tombigbee River and its several large tributaries drain the prairie region and that section of the State. The Tombigbee drains in Mississippi and Alabama an approximate area of 18,918 square miles. The Yazoo River and its tributaries drain a surface of 13,936 square miles. The Pearl River, from its source in Winston County to where it empties into the Gulf, drains a surface of 8,964 square miles. The Pascagoula River and its tributaries, running through the southern pine region and emptying into the Gulf, drains an area of 8,980 square miles. Besides these there are numerous other rivers, and small streams well distributed throughout the State. Generally the water-courses on the west flow to the Mississippi River, on the east to the Tombigbee River, and on the south to the Gulf of Mexico. These are, therefore, the three great watersheds of the State.

Passing to the consideration of the geological and agricultural features of the State, the divisions, as laid down by Prof. E. W. Hilgard, formerly State geologist, are observed, from whose valuable report a part of the information, under the separate divisions, has been taken. The lines marking or separating the subdivisions are not always clearly drawn, it is true, but there are generally well-defined characteristics, prominent in each group, which greatly facilitate this method of considering the principal agricultural and topographical features of the State.

I.—THE NORTHEASTERN PRAIRIE REGION.

The following counties lie wholly or partly within the section of the State usually denominated the "Northeastern Prairie Region": Alcorn, Tishomingo, Itawamba, Union, Lee, Monroe, Prentiss, Lowndes, Clay, Noxubee, East Tippah, East Pontotoc, East Chickasaw, East Oktibbeha, and Northeast Kemper. These are not all prairies counties, strictly speaking, but are catalogued together as counties in which prairie lands occur to a greater or less extent. This section is sometimes designated as the Cretaceous or Northeastern Lime Region. Its prominent agricultural and geographical features are dependent upon the several calcareous strata of the Cretaceous formation, with the exception of a few townships in the eastern part of Tishomingo County, where the limestone and sandstone strata of the Lower Carboniferous formation prevail.

The Cretaceous formation in this State consists essentially of four different stages or beds, which have a west or southwest dip of about twenty-five feet to the mile. The uppermost of these divisions, the Ripley group, which appears to the westward of the others, consists of hard sandy limestone, with strata of blue shell marl between, and generally one of heavy gray calcareous top; these strata, overlaid by a yellow or orange-colored loam, combine to form what is known as the "Pontotoc ridge." The middle stratum consists of white clay marls or soft limestone—"rotten limestone"—and forms a level or gently undulating surface, mostly with heavy calcareous soils, partly prairie, partly oak uplands, and known as the Prairie Region proper. The other two sections—the Eutaw and Tombigbee Sand groups—consist of sands, more or less clayey and partly limy; the region occupied by them is hilly and sandy, while there are abundant springs of water, principally freestone. The specific names here given to these stages or groups are the ones already recognized and understood to some extent. The lands in the territory of the Carboniferous formation, consisting of hard limestones and sandstones, do not differ essentially from the last-mentioned groups, save, perhaps, in the abundance of pebbles on the surface and the many fine, cold, freestone springs.

In the western portions of Tishomingo and Itawamba Counties are found gently undulating oak uplands, interspersed with spots and

patches of black and bald prairie, with wide fertile bottoms. To the eastward is a more hilly region, with a light sandy soil, and a prevalent timber growth of short-leaf pine, blackjack, and chestnut. The bottoms are narrow, but fertile. Beyond these are found in Tishomingo County a more gently undulating region, a more fertile soil, and a rare mixture of timber growth not often found together on the same soil. The Tennessee River flows along the northeastern corner of Tishomingo County, but it has little or no bottom on the Mississippi side, the pine hills approaching very close to the bank, which is timbered with walnut and sycamore, trees not common in the interior of this region. Yellow Creek, in the same county, has at its heads a very wide bottom, but a quite narrow one in the lower portion of its course. The hills bordering on the bottom are quite fertile and produce excellent crops.

Professor Harper mentions the existence of a valuable deposit of kaolin, or porcelain clay, in Tishomingo County, which he considers the most extensive deposit in the world, extending over not less than 50 or 60 square miles. He says the kaolin region contains different kinds of porcelain clay, from the finest, whitest, and purest to coarse and colored kaolin; all kinds are useful—the finer for fine chinaware, the coarser for inferior porcelain or other pottery. Further investigations by a competent geologist are needed to confirm the opinion of Professor Harper. There are also fine deposits of red clay and pure silica in the Carboniferous district. An analysis of the silica gave the following result:

	Per cent.
Silica	97.190
Alumina	1.700
Lime	0.310
Oxide of iron	0.200
Magnesia—inappreciable.	
Water and loss	0.600
	100.000

The eastern part of Itawamba County, beyond the wide and fertile bottoms of the Tombigbee, is broken, with a sandy, loamy soil, susceptible of good production.

The best portion of Tishomingo and Itawamba Counties is known as the "white lime country."

The prairies proper are level or very gently undulating tracts, possessing a deep black, heavy soil, on which timber is very much scattered or altogether wanting, and form belts or series of disconnected patches, having on the whole a north and south course. The prairies are the largest and most continuous, exactly in the middle of the Cretaceous or lime group; along the line of Chickasaw and Monroe Counties, and in the two northwestern townships of Lowndes County, they are about 32 miles long, and occupy an area of about 75 square miles, or 48,000 acres of land, and they occupy very nearly as much along the line of Lowndes and Oktibbeha, and in Noxubee and Kemper Counties. The country

is interspersed with tracts of a more gently undulating surface, sloping down to the streams, forming the rich and fertile "hummock" lands for which this region is noted. Altogether, this rich prairie country is one of the most inviting portions of the State, resembling very much the prairies of Illinois, but having the great advantage of a good supply of fine timber near at hand. Abundant crops are raised in this district, and during the present year corn has been selling at 35 and 40 cents per bushel delivered. It is destined, also, to be a great grass and stock country. It is peculiarly adapted to this industry, and its citizens are taking a deep interest in the cultivation of the grasses and the raising of improved stock.

A sample of Monroe County prairie soil, at a depth of 8 inches, showed a dark gray color when dry and black when wet. In washing with warm water this soil yielded 2.1 per cent. of smooth, round concretions of iron ore from the size of buckshot down to that of poppy seed, together with a little sharp white sand. Saturated with moisture at 67.1° Fahrenheit, it lost 10.535 per cent. of water at 400° Fahrenheit, and the soil thus dried lost, by ignition, organic matter and water to the extent of 6.091 per cent.

A sample of the under subsoil, taken at the depth of 3 feet, showed a dirty greenish color, and formed a tough paste when wet, which crumbled when dry. It consisted of—

Insoluble matter	71.539
Potash	0.542
Soda	0.230
Lime	1.075
Mangnesia	0.771
Brown oxide of manganese	0.046
Peroxide of iron	5.419
Alumina	13.153
Phosphoric acid	0.051
Sulphuric acid	0.036
Organic matter and water	6.992
	99.945

II.—THE FLATWOODS REGION.

This region embraces small parts of the counties of Tippah, Union, Pontotoc, Choctaw, Oktibbeha, Calhoun, Winston, Noxubee, and Kemper. The level lands, timbered chiefly with post-oak, often accompanied by black jack and short leaf pine, popularly styled the "flatwoods," form a narrow belt which borders on the west the Cretaceous or Northeastern Prairie Region. The usual width of the flatwoods proper is from 3 to 6 miles; in some places the bordering hills encroach upon them so as to greatly reduce their width; in others the hills recede so far as to inclose between them a level tract of 10 or 12 miles. Their outline is therefore much scalloped and difficult to define with accuracy. This district begins at the north on the southern bank of Tippah Creek, in the county of the same name, and runs in a slightly south-

eastern direction toward De Kalb, Kemper County, where the Succarnochee River may be considered their southern limit; for beyond they gradually lose their character and pass into the common yellow-loam uplands of that portion of Alabama. It is an attractive, level country, and possesses an abundance of fine post-oak timber, valuable for railroad and building purposes. The soil is generally a hard gray or whitish clay when dry, and of dark gray, almost black, when wet. Two kinds of soil are noticed, a light soil and a heavy soil, the latter being on the whole more prevalent than the former. The following is given as the composition of the two soils:

I.—Heavy Flatwoods Soil, Pontotoc County.

Depth.—No perceptible difference between soil and subsoil; specimen taken down to 12 inches.

Vegetation.—Post-oak, short-leaf pine, some little Spanish (*"red"*) oak, and occasionally a little hickory.

The soil, saturated with moisture at 72.5° F., lost 9.333 per cent. of water at 400° F. Dried at this temperature, it consisted of—

	Per cent.
Insoluble matter	77.854
Potash	0.753
Soda	0.106
Lime	0.178
Magnesia	0.831
Brown oxide of manganese	0.167
Peroxide of iron	5.899
Alumina	10.302
Phosphoric acid	0.052
Sulphuric acid	0.032
Organic matter and water	3.689
	99.841

II.—Light Flatwoods Soil, Chickasaw County.

Depth.—No perceptible difference between soil and subsoil; specimen taken to the depth of 12 inches.

Vegetation.—Almost exclusively post-oak; very little Spanish (*"red"*) oak; huckleberry bushes in the depressions.

A pale gray, powdery soil, mostly fine siliceous matter, with little clay. Its mass is full of ferruginous dots, which increase downwards.

The air-dried soil lost 2.050 per cent. of water at 400°, at which temperature it consisted of—

	Per cent.
Insoluble matter	93.575
Potash	0.254
Soda	0.066
Lime	0.082
Magnesia	0.175
Brown oxide of manganese	0.111
Peroxide of iron	1.445
Alumina	2.605
Phosphoric acid	0.008
Sulphuric acid	Trace.
Organic matter and water	1.333
	99.653

In comparing the analyses of these two soils, it will be perceived that the difference between them in a chemical point of view is no less striking than that which exists in their physical properties. The *light* soil is a poor one in *all* respects—deficient in all the nutritive elements of plants as well as in vegetable matter: for the loss of weight of 1.333 per cent., which the soil experiences by ignition, is due almost entirely to the expulsion of water.

In this last-named particular the *heavy* soil resembles the other, being likewise almost entirely destitute of vegetable matter; the loss it experiences by ignition is mainly owing to the expulsion of water (viz., the water of hydration of the oxide of iron and clay). But in all other respects it differs very essentially from the *light* soil. It contains an amount of potash equal to that of the best uplands, and even some of the prairie soils. Its supply of soda is rather small, but perhaps adequate. In lime it is *deficient*, as compared with other soils containing a similar amount of potash; a circumstance directly contradictory of the prevailing popular impression on the subject, it being frequently said that the failure of crops on this soil is owing to an excess of lime. Of magnesia there is an abundant supply; so also of manganese, and of iron. Of phosphoric and sulphuric acids the supply is rather small, yet not so much so as to render the soil unproductive, provided they be in an available condition.

The most important chemical defects of this soil, therefore, consist in its deficiency in lime and vegetable matter, and to some extent in soda and phosphoric acid.

It is not claimed that the analyses of the soils above quoted represent with entire correctness the respective average composition of the flatwoods soils. The tract on which they occur has such length that perfect uniformity in the composition of the soils is not to be expected. It is, besides, well known that while some parts of the flatwoods are quite poor, other portions are fertile and yield excellent crops. An important and interesting fact is mentioned in connection with the flatwoods soils. It has been noticed that soil which at the time of the early settlement of the country would scarcely produce anything will now bring fair average crops. This change has been attributed to the circumstance that the tramping of cattle having rendered the soil somewhat more solid, and therefore less subject to drought, it has been made capable to some extent of retaining moisture.

On the heavy flatwoods soils very good crops are made when planted early, and in favorable seasons. The soils seem to be deficient in clay and vegetable matter. The vegetable matter may be easily supplied by turning under green crops during the wet season, which would supply the humus which is so favorable to all vegetation, rendering the soil lighter, easier tilled, and less liable to suffer either by drought or excessive wet weather. A compost of vegetable matter and lime, or calcareous marl, allowed to decompose to some extent before applying to the soil, it is thought, would render these lands highly fertile. The bottom soils of the flatwoods generally bear a fine timber growth, which is a sufficient proof of their fertility.

III.—THE YELLOW-LOAM REGION.

This is the most extensive of the subdivisions, comprising Northwest Tippah, Marshall, the greater part of De Soto, East Panola, La Fayette, West Calhoun, Benton, Tate, Yalobusha, part of East Tallahatchie, Grenada, East Carroll, Montgomery, Webster, Choctaw, East Holmes, Northeast Yazoo, North Madison, Attala, Leake, Winston, Neshoba, part of Kemper, Lauderdale, Newton (greater part), and northeast corner of Scott Counties. The general characteristics of the soils of this region are thus defined: The better class of uplands are formed by a yellow or brownish-yellow loam, varying greatly in thickness from a few inches to as much as 3 feet, generally a light soil, underlaid by either loose sand or red hardpan of the orange sand formation; while on the poorer uplands the loam is very thin or entirely absent, and some of the materials of the orange sand, or their intermixture with the yellow loam, form a sandy soil, which, though often quite productive at first, wears out rapidly, unless good care is taken to preserve it. There are, of course, all degrees of transition from one extreme of soils to the other. The timber growth generally shows their character and value. A good-size post-oak of sturdy, thickset growth, with stout, crooked branches, which decrease rapidly in thickness, and with a dense, well-shaped top, will never be found on a poor or easily exhausted soil; if, however, it is small and scrubby, with numerous small branches, and a long, tattered top, or its trunks are tall, thin, and tapering, with long, rod-shaped branches, themselves often covered with stout foliage, and an open, irregular top, little is to be expected of the natural resources of the soil. In determining the character of the soil by the timber, the size and growth of the trees, as well as their mode of growth, should be taken into consideration. In this region are the lands known as the "Marshall table-lands," which are among the best uplands in the State, and are considered to be particularly adapted to the production of cotton. The soil is formed of a brown loam, generally from 6 to 8 feet in thickness, sometimes more. The material is, on the whole, rather heavier than that of the yellow-loam lands of South Marshall and Lafayette Counties.

The sturdy, vigorous growth of the post oak and the hickory denote a soil of unusual fertility. In the northwest portion of Tippah County are, apparently, the same class of table-lands.

The bottom soils of this entire region, found along its numerous streams and water-courses, vary much in conformity to the soils of the surrounding uplands, from whence the deposits of surface and washings come. They bear, as it were, the average character of the hills from which they receive their washings—usually with the addition of vegetable matter—and hence the bottom soil of one stream is often changed when other streams unite with the first, carrying with them, of course, their peculiar deposits, to mingle with the others, and modifying their character

accordingly. The bottoms are usually very fertile, so much so that few of them have as yet suffered much from long cultivation. Many of them are annually overflowed, and are therefore constantly receiving a fresh supply of fertilizing ingredients. These wide creek bottom lands of this entire district are highly prized by agriculturists, are easily cultivated, and produce bountiful crops, often from 25 to 50 bushels of corn to the acre, and from half a bale to a bale of cotton to the acre. It pays handsomely to fertilize these lands, and it is hoped that more of it will be done by farmers than has been the case in the past. There is a heavy growth of valuable woods throughout the district, especially on the bottom lands. Beds of good lignite have been found in this district, which, it is said, has been used by blacksmiths in preference to charcoal. No estimate of the commercial value of these deposits of lignite can be made until further explorations are made by a competent geologist.

IV.—THE CENTRAL PRAIRIE REGION.

Comprising, in the main, the portions underlaid by the calcareous Tertiary of the counties of Madison, Yazoo, Warren, Hinds, Rankin, Scott, Smith, Jasper, Newton, Lauderdale, Clarke, and Wayne.

The prairies characterizing this region are not generally the prevalent features of its surface—not near to the extent to which this is the case in the Northeastern Prairie Region. They do not anywhere form such continuous or large bodies of land as is found occupying the surface of the country underlaid by the Cretaceous formation, nor is the surface of the country so gently undulating and generally level.

The black prairie soil occurs in patches of a few acres to several thousand in extent, and intervening between elevated ridges occupied either by the orange-sand formation and its peculiar soils, or by the soils derived essentially from the materials of the clayey non-calcareous or gypseous stages of the Tertiary—forming in the western portion of the belt the lighter soils of the "gypseous prairie," and in the eastern portion of the belt the heavy intractable soils of the "hog-wallow prairie." Both of these occupy, in general, positions above any contiguous "black prairie," the latter being in the more hilly portions of the region confined to the slopes and bottoms of the streams. They are sometimes called "shell prairies" from the great abundance of fossil shells, accompanied sometimes by the remains of the huge Zeuglodon. The ridge lands intervening between the several kinds of prairie lands bear, partly in the north, the character of the soils of the adjoining Yellow Loam Region, and in the south the character of the soils of the adjoining Long-leaf Pine Region. Beyond the Chickasawhay, in Clarke and Wayne Counties, the black prairies are found on the summit of the ridges. Parts of the district here described, while not underlaid by the marl formations, are more nearly related in their agricultural features to those of the Prairie Region than to any other.

The adjoining halves of Hinds and Madison Counties probably show the prairie features of this district more plainly than any other part of

it. Level or gently undulating uplands, possessing a fertile soil and deep loam subsoil, interspersed with patches of prairie, are the permanent characteristics of this part of the region. These lands are considered among the best uplands in the State, but an improvident system of agriculture and exhaustive cultivation in the past has done them serious injury. The work of restoration is now, happily, in progress, and they can easily be made to excel their original fertility. It is believed that the subsoil loam is as rich as the surface soil, and it is suggested that the use of the subsoil plow and stimulation is what is needed on these lands, as they are not deficient in any of the ingredients of a good soil. The following analysis of subsoil, at the depth of 9 to 20 inches, seems to sustain this view:

	Per cent.
Insoluble matter	80.788
Potash	0.634
Soda	0.185
Lime	5.921
Magnesia	0.266
Brown oxide of manganese	0.159
Peroxide of iron	4.727
Alumina	8.940
Phosphoric acid	0.151
Sulphuric acid	0.076
Organic matter and water	3.239
	100.393

There are extensive beds of the best marl in this central section of Mississippi, and the means for cheap fertilizing are near at hand, and can be manipulated, as desired, and applied at small cost. The grasses especially do well throughout this region, and there is already abundant pasturage of Bermuda and other grasses. It has all the requirements for a stock country. Much attention has been paid to fruits and vegetables in this district, and it is well established that the soil is peculiarly adapted to their successful production.

V.—THE LONG-LEAF PINE REGION.

This extensive district embraces the counties, and parts of counties, of Clarke, Wayne, Covington, Perry, Green, Jones, Marion, Lawrence, Lincoln, Pike, Amite, Franklin, Hancock, Harrison, Jackson, Copiah, and Simpson.

It presents great uniformity of character in its surface conformation, in its soils, and in its vegetation. The surface is generally undulating, not unfrequently hilly, especially where the uplands fall off towards the larger water-courses; between these, however, often occur dividing plateaus, or table lands, which are but gently undulating, or mostly level. The surface soil of the uplands is generally very sandy. The bottom and second bottom lands, to which cultivation is generally, as yet, restricted, are quite fertile, and yield good crops of sugar-cane, up-

land rice, corn, cotton, fruits, vegetables, &c. An analysis of the soil of the pine uplands gave the following results:

	Per cent.
Insoluble matter (chiefly fine sand)	889.801
Potash	0.218
Soda	0.076
Lime	0.034
Magnesia	0.806
Brown oxide of manganese	0.072
Peroxide of iron	2.402
Alumina	3.783
Phosphoric acid	0.036
Sulphuric acid	0.038
Organic matter and water	3.446
	100.202

And the subsoil the following:

	Per cent.
Insoluble matter (clay and fine sand)	77.931
Potash	0.266
Soda	0.072
Lime	0.152
Magnesia	0.352
Brown oxide of manganese	0.091
Peroxide of iron	5.456
Alumina	11.870
Phosphoric acid	0.043
Sulphuric acid	0.035
Water and organic matter	3.261
	99.934

It is shown by the above analyses that both soil and subsoil are below the average in the absolute amount of nutritive ingredients contained in them, and that there is but a slight difference in this respect between the soil and the subsoil. The subsoil, it will be observed, is richer in lime than the top soil, and possesses, also, to a greater extent the quality of retentiveness. These facts point the way to the proper and natural manner to improve these soils. Nutritive manures should be applied in connection with deep plowing and subsoiling in order not only to increase the retentive qualities of the surface soil, but also to make the subsoil accessible to the roots of plants, diminishing the liability to injury by drought. Without deep plowing the fertilizer will, to a great extent, be carried beyond the reach of plants. As lime and calcareous marls would be highly advantageous to these soils, the marl beds at Byrom and at Jackson might be used for localities along the Illinois Central, Vicksburg and Meridian Railroads, and along Pearl River.

It is believed, as before suggested, that the soils of the Long-leaf Pine Region are generally deficient in the nutritive ingredients of plants, and that therefore nutritive manures should be relied upon for their improvement in every case where the subsoil is such as to give promise of sustaining that improvement. The use of pine straw, of which there is a great abundance in this region, has been suggested, and in some cases

the plan has been followed. A great difference of opinion exists, however, as to its value as a fertilizer, and while some have found it very beneficial, others declare it little better than useless, and even injurious.

This section of the State was one great pasturage when received from the hands of the Indians. The injudicious burning of woods, at times when the fire parches the hearts and roots of the grasses, have seriously injured the pasturage in many places, but it is still a highly favored section in this respect, and is well suited for sheep and cattle raising. This part of the State has many advantages, and is susceptible of great results under an improved system of agriculture. Besides its great wealth of long-leaf pine (*Pinus australis*) and its adaptability to stock raising, its lands can be made generally to produce excellent crops, while it is unusually well supplied with clear, brisk streams, furnishing fine water-power for manufacturing purposes.

Hon. J. F. H. Claiborne, who has lived on the Mississippi Gulf coast for years, writes as follows to the State Board of Immigration:

The peach, apple, plum, pomegranate, pear, and fig, pecan, grapes of many varieties, strawberries, dewberries, blackberries, persimmon, mulberry, pawpaw or custard fruit, and melons of various kinds grow in great perfection, and yield abundant returns. Nearer the seashore we find, in addition, the orange, lemon, citron, shaddock, jujube, almond, banana, olive, and occasionally the pineapple. The orange is just now attracting much attention. The best locality for them, it is thought, is near the water or salt marshes, with the protection of the pine forest on the north. On the high bluffs of our salt-water bayous the orange flourishes; and we have trees on this coast in full bearing 60 years old and no symptoms of decay. Orange trees planted in the open pine woods do well and suffer less than elsewhere from cold. The orange, like many other plants, may be trained to endure cold weather. I prefer to give my trees a northern exposure. They grow and flourish on almost any soil on the coast. A little ashes, oyster-shell lime, marsh mud, and an occasional mulching is all they require. They can be planted about 20 feet apart, and the orchard can be cropped with pease, potatoes, melons, or vegetables. They will bear fruit in four, five, or six years—the grafted fruit, the earliest, are subject to few diseases; are very long-lived; require less attention than any other fruit tree, and will average in full bearing, 1,000 oranges to the tree. The demand is unlimited. The oranges on the coast are pronounced superior in flavor to any in the market; $10 per thousand, at the orchard, is about the average value.

VI.—THE YAZOO DELTA.

The great, rich alluvial plain lying in Mississippi, and commonly known as the Yazoo delta, is one of the most important formations not only in the State, but in the entire Union. It lies between the Mississippi River on the west, and the Yazoo River and its tributaries on the east, and from the line separating Mississippi and Tennessee on the north to Vicksburg on the south. It comprises about 6,250 square miles, or 4,000,000 acres, of some of the most fertile and productive soil in the world. It is larger than the combined area of Connecticut and Rhode Island, and almost half as large as these two States and Massachusetts all combined.

This vast delta is ellipsoidal in shape, and its dark, rich alluvium has been formed by the overflow of the Mississippi and Yazoo Rivers and

their tributaries. At its northern limit, the State line, it is very little more than 10 miles wide, but the Mississippi River, turning to the southwest, it widens rapidly, and 30 miles southward, where the dividing line between Panola and Tate Counties would strike the bluff near Helena, Arkansas, it is about 36 miles wide. Opposite Charleston, Tallahatchie County, the bottom is about 58 miles wide. It reaches its greatest width about opposite the town of Carrollton, Carroll County, where it is about 68 miles wide, and from thence it at first narrows slowly, and at last rapidly. Opposite Yazoo City it is still more than 40 miles wide, but ends near Vicksburg, where the hills extend to the bank of the Mississippi River. Of all this fertile plain only about one-eighth, or 500,000 acres, is improved, the remainder being covered with vast forests of valuable timber. The prejudice which long existed as to its supposed unfitness for cultivation and for health, is rapidly dying out, and it is now generally considered, in its vast possibilities, of more value than all the other sections of the State combined. It is true that much of the delta is subject to overflow in times of high water, and on this account has often been avoided, but with a proper system of levees this disadvantage may to a great extent be removed. Even the lands subject to overflow, with the present system of levees, will, on an average in a given series of years, produce better returns than most of the upland country.

The soil of the delta is of two classes, loam and clay, the former varying in color, but generally dark and easy to cultivate. The clay lands are popularly known as "buckshot lands," from the soil drying into angular bits the size of a buckshot, and of a lead color. When wet this soil is soft, smooth, and slippery, and when dry is loose and light, and falls to pieces. The "buckshot" lands are considered the most productive in the delta, taken one year with another, and will easily produce, with proper cultivation, from 1 to 2 bales of cotton, and from 60 to 80 bushels of corn per acre. Professor Hilgard ascribes their fertility mainly to certain ferruginous concretions which they contain, and deems them almost inexhaustible. He has lately given in a census report the following analyses of the soils of the Yazoo bottom:

No. 296. *A light "buckshot" clay*, taken from the edge of a depression or pond, near where the preceding specimen was obtained. It is light yellow in color, and similar to the clay in the bank of Sunflower River.

Nos. 376 and 377. *Soil and subsoil of front-land of Indian Bayou*, taken near C. Gillespie's, range 5 west, township 19, section 33, Sunflower County. The soil is grayish and rather sandy, and was taken to the depth of 5 inches. The subsoil is close, whitish clay with reddish flecks, and less "jointy" than the same clay from Sunflower River and Silver Creek. The specimen was taken to the depth of 5 to 18 inches. The timber-growth is hickory, holly, sweet gum, water, willow, red, and swamp-chestnut oaks, dogwood, ash, maple, and an undergrowth of cane. This "white" land is not much esteemed by farmers.

No. 354. *Bottom soil of the Tallahatchie River*, range 1 east, township 24, Tallahatchie County, taken to the depth of 12 inches. A dark-colored and rather light loam, a

good representative of the front-lands of the upper Yazoo, Tallahatchie, and Cold-Water bottoms.

No. 394. *Soil of Sunflower River front-land ridge,* taken on the bank at Buck's Ferry, Issaquena County. It is a stiff, pale gray loam, with yellowish or orange flecks, so that when worked up the soil is somewhat yellow. Specimen taken to the depth of 10 inches; it is underlaid at 4 to 6 feet by "buckshot" clay. The prominent trees are sweet gum, maple, willow, oak, elm, ash, and hackberry.

No. 390. *"Buckshot" soil of Deer Creek back-land,* from the plantation of J. D. Hill, near Steel's Bayou, Issaquena County. It is a stiff, dark-colored clay soil, traversed by numerous cracks, and mottled with spots of ferruginous matter. Upon drying it breaks up into little angular fragments. It is exceedingly fertile, and there is no change in its character for 10 feet. The timber-growth is sweet gum, pecan, water and willow oak, hackberry, and honey locust; an undergrowth of cane covers most land. The specimen was taken to the depth of 12 inches.

Yazoo bottom soils.

Constituents.	Coahoma County.		Tallahatchie County.	Sunflower County.		Issaquena County.	
	Dogwood ridge soil.	Light-colored "buckshot" clay.	Tallahatchie bottom soil.	Indian Bayou front-land soil.	Indian Bayou front-land subsoil.	Sunflower River front-land soil.	Deer Creek "buckshot" soil.
	No. 395.	No. 396.	No. 354.	No. 376.	No. 377.	No. 394.	No. 390.
Insoluble matter	83.886	75.513	87.146	87.898	87.898	71.164	51.063
Soluble silica	7.022	10.895	4.798	4.036	3.816	13.506	20.704
	90.908	86.408	91.944	91.934	91.714	84.670	71.767
Potash	0.392	0.606	0.301	0.226	0.305	0.401	1.104
Soda	0.086	0.146	0.084	0.116	0.079	0.191	0.325
Lime	0.259	0.386	0.301	0.153	0.147	0.406	1.349
Magnesia	0.596	0.972	0.385	0.256	0.392	0.696	1.665
Brown oxide of manganese	0.086	0.133	0.158	0.048	0.050	0.011	0.119
Peroxide of iron	2.691	2.804	2.120	1.848	2.312	3.815	5.818
Alumina	3.593	4.457	2.151	2.565	2.998	6.889	10.539
Phosphoric acid	0.142	0.278	0.112	0.162	0.283	0.165	0.304
Sulphuric acid	0.010	0.007	0.005	0.062	.....	0.016	0.024
Water and organic matter	2.007	4.401	2.644	3.013	1.499	2.748	7.369
	100.700	100.598	100.205	100.383	99.779	100.038	100.383
Hygroscopic moisture	3.945	6.043	4.786	4.067	5.684	7.385	14.305
Absorbed at	10 C.°	12 C.°	22 C.°	14 C.°	15.5 C.°	15 C.°	15 C°.

The Tallahatchie bottom soil (No. 354) is from near the edge of the bottom on the Tallahatchie River in Tallahatchie County. It is noteworthy that its phosphates are lowest of all the soils here shown; while the phosphoric-acid percentages in the older deposits, represented by Nos. 390, 396, and 377, are extraordinarily high.

Without entering into a detailed discussion of these soils in this place, it is important to call attention to the fact that in its store of plant-food of all kinds, the "buckshot" soil stands pre-eminent above all the rest, and well justifies its reputation of being the most productive and durable soil of the great bottom. Unlike most other clay soils it may be tilled at almost any time when the plow can be propelled through it, because, on drying, it crumbles spontaneously into a loose mass of better tilth than many an elaborately tilled upland soil. It is of such depth that the deepest tillage, even by the steam plow, would not reach beyond the true soil material; and its high absorptive power secures crops against injury from drought. At the same time (owing, doubtless, to its being traversed by innumerable fine cracks, and underlaid by gravel or sand) it drains quite readily. In good seasons, a large part of the cotton crop grown on this soil has often been left unpicked for want of labor after taking off 1,500 to 1,800 pounds of seed-cotton to the acre. Two bales of lint per acre can undoubtedly be produced on such soils, with fair culture and good seasons.

Many years ago the Mississippi River had an outlet into the delta through the Yazoo Pass and other bayous, but these have been closed by levees, and, except occasional breaks, there is now a complete system of levees, beginning south of Memphis and running to the mouth of the Yazoo River. If these levees were made secure, and further strengthened at exposed points, and the jetty system of deepening the channel adopted, there would probably be very little danger from destructive inundation. This important subject has the earnest consideration of Congress, of the State of Mississippi, and of the counties lying within the delta, and it is confidently expected that in the near future everything that human endeavor can accomplish will be done to protect these valuable lands from inundation and bring them up to the high state of production of which they are susceptible. The southern extension of the Chesapeake, Ohio and Southwestern Railroad will soon be completed from Memphis to New Orleans, penetrating the heart of this delta; and it is believed that this corporation will aid materially in the construction and preservation of the levees.

It may be remarked here that the people of the delta are not unmindful of what they can themselves accomplish by organized effort. Four of the richest and most productive counties in the district have organized for their own protection, and it is expected that at the next session of the legislature measures will be adopted to include all the other counties interested into this protective combination. The Mississippi levee district, composed of the counties of Bolivar, Washington, Issaquena, and Sharkey, has a regularly-constituted board of levee commissioners, with necessary officers, charged with the duty of the construction, preservation, and repair of levees to protect those counties. This organization has already accomplished a great work, which shows what may be done by an earnest, effective co-operation of local interests. It is on a sound financial basis, its paper being worth its face value in New York City. The necessary funds are raised by a tax on each bale of cotton and on

lands, but the cotton tax is the one mainly relied upon. The amount of money expended annually and the value of the securities of the Mississippi Levee Board will give an idea of the resources of these fertile counties. There are probably not four other counties in the Union, outside of the delta, with such a sparse population, whose citizens would voluntarily, year after year, raise from among themselves such a sum in addition to the usual State, county, and municipal tax. The entire population of the four counties composing this district was, in 1880, 60,289, of which only 8,403 were whites. The following statement of taxes collected for the several years named by the Levee Board is taken from official reports:

Total yield of taxes, cotton, acreage, and ad valorem for years 1875–'80.

Tax.	Currency.	Scrip and interest.	Totals.
Land tax 1875, 5 cents per acre	$4,290 19 A	$14,954 27 B	$19,244 46
Land tax 1876, 5 cents per acre	18,680 54	1,500 00	20,180 54
Land tax 1877, 2½ cents per acre	11,095 04		11,095 04
Land tax 1878, 2½ cents per acre	14,509 09		14,509 09
Land tax 1879, H, 2½ cents per acre	15,536 89		15,536 89
Ad valorem tax 1875, 15 mills	2,625 60 C	46,995 04 D	49,620 64
Ad valorem tax 1876, 15 mills	1,759 93	48,427 08	50,187 01
Ad valorem tax 1878, 5 mills	30,942 20		30,942 20
Ad valorem tax 1879, 5 mills	29,606 05		29,606 05
Ad valorem tax 1880, 5 mills	30,438 51 E		30,438 51
Cotton tax 1875, $2 per bale	96,535 99 F	79,142 25 G	175,678 24
Cotton tax 1876, $2 per bale	126,730 04	1,829 21	128,559 25
Cotton tax 1877, $3 per bale	270,717 97	349 95	271,067 92
Cotton tax 1878, $2 per bale	142,628 32		142,628 32
Cotton tax 1879, $1.50 per bale	157,875 75		157,875 75
Cotton tax 1880, $1 per bale	87,429 02		87,429 02
Land sale and redemption January 14, 1876, to October 1, 1881	64,026 71	7,307 54	71,334 25
Total	1,105,427 84	200,505 34	1,305,933 18

VII.—THE BLUFF FORMATION—"THE CANE HILLS."

A narrow, hilly belt of land, with a peculiar surface formation and soil, fringes the borders of the Mississippi bottom in North Mississippi and the great river itself in the southern portion of the State. This is usually characterized as the bluff formation and in part as the "Cane Hills." It exhibits a remarkable uniformity of character, consisting of a fine silt, almost too siliceous to be termed a loam, of a grayish or yellowish buff tint. The average thickness of the calcareous silt stratum over the whole region has been estimated at between 25 and 35 feet. This formation widens out south of Vicksburg into a belt 10 to 15 miles in width, running parallel, in general, to the Mississippi River. The denudation of these deposits has caused the surface to be very much broken by deep and steep valleys and ravines, while the streams which make through this district have excavated wide, shallow, sandy beds, in which, at ordinary stages of water, they course from one bank to the other in secondary channels, only a few yards wide at times, made in the loose, shifting sands. In times of high water, when they fill and overflow their main channels, these streams are very wide, rising and

falling rapidly, and often carrying with them great masses of sand and driftwood. In the Cane Hills proper the streams originating within this belt are characterized by deep, narrow channels, with almost vertical banks, winding their tortuous course in narrow valleys from one steep slope to another. The upland soils of this district are very fertile, and when fresh will produce a bale of cotton and from 30 to 50 bushels of corn per acre. With proper care and treatment this degree of fertility may be kept up, and even exceeded. It is believed, however, that this territory may be put to much better use than the raising of corn and cotton, and that is the culture of the vine, for which it seems to be well adapted. The luxuriant growth of native grapevines indicate this, while the timber growth and the soil have the same general characteristics of the best vineyard lands of other countries. The climate also is favorable, being similar to that of the Mediterranean coast.

CLIMATE, TEMPERATURE, RAINFALL, AND HEALTH.

The climate of Mississippi is all that could be desired for agricultural purposes. It is a happy medium between the extremes of heat and cold. The winters are short, mild, and pleasant; the summers are in the main devoid of the intense heat often felt in more northern latitudes. The summer heat is, indeed, more prolonged, but much less oppressive than farther north, owing to the proximity of the State to the Gulf and the prevalence of cool, refreshing winds blowing from that direction. The thermometer seldom reaches 100° in summer in any part of the State. June, July, and August are the hottest months, but the range of temperature for the State in these three months is about from 64° to 95°, with a mean of about 81°. In winter ice of about an inch in thickness forms in the northern part of the State, while in the southern part frosts rarely occur. November, December, and January are the coldest months. The average winter temperature is not below 45°, and the thermometer seldom falls to 25°. It is a well-established fact that in the course of a year more outdoor labor can be performed with less inconvenience than in regions farther north. As has been elsewhere stated on the subject of labor, there is no climatic obstacle in the way of white labor in the State. The elevation of the State is, moreover, greater than is generally supposed, and this gives a climate normally belonging to regions from 1° to 2° farther north. This will appear more readily from the following table showing the elevation of sections on railroads running north and south:

STATIONS ON THE MOBILE AND OHIO RAILROAD.		STATIONS ON THE ILLINOIS CENTRAL RAILROAD.	
Station.	Elevation.	Station.	Elevation.
	Feet.		*Feet.*
State Line	256	Osyka	250
Waynesborough	191	Magnolia	300
Quitman	231	Summit	420
Enterprise	248	Brookhaven	500
Meridian	336	Beauregard	450
Lockhart Summit	426	Hazlehurst	430

STATIONS ON THE MOBILE AND OHIO RAILROAD.

Station.	Elevation.
	Feet.
Macon	185
Brooksville	275
Crawford	316
Artesia	244
West Point	242
Muldon	304
Okolona	311
Verona	307
Tupelo	280
Baldwyn	379
Boonville Summit	513
Boonville	511
Rienzi	441
Corinth	443

STATIONS ON THE ILLINOIS CENTRAL RAILROAD.

Station.	Elevation.
	Feet.
Crystal Springs	455
Terry	260
Jackson	270
Madison Station	350
Canton	320
Durant	315
Vaiden	355
Winona	380
Grenada	308
Water Valley	355
Oxford	685
Holly Springs	850
Lamar	645
Grand Junction	795

There are also many hills and elevations from 800 to 1,500 feet above tide-water at New Orleans. In connection with the above, it may be stated that more than one-fourth of the entire population of the United States exists on elevations from 100 to 500 feet.

RAINFALL.

Mississippi as an agricultural country has advantages unsurpassed in the vital matter of rainfall. The abundant luxuriant vegetation to be seen here on every hand during the hottest summer months shows the presence of ample moisture to vitalize and promote the growth of all vegetation. As a matter of course there are short seasons of drought occasionally, for these occur everywhere, but they are less frequent here than in many States, and are generally confined to small and widely separated areas. The rainfall is usually copious throughout the State in the spring and summer, while the annual precipitation is more or less evenly distributed in all sections of the State. From the south and west come the regular rain winds, bringing refreshing showers, highly conducive to the growth of the cotton, the cereals, and other vegetation. The tables of the census give the annual rainfall in North Mississippi at from 48 to 58 inches per annum, while in South Mississippi it is 58 inches per annum. The high country lying between the Tombigbee and Yazoo Rivers has fully 58 inches per annum, and the Yazoo delta has as much as 48 inches of annual rainfall. The degree to which the State is favored in this respect may be appreciated when it is remembered that the country west of the Mississippi ranges from 20 to as low as 4 inches of rainfall per annum. Kansas, Texas, and the Indian Territory have from 20 to 38 inches per annum, and Maine, New York, Virginia, and Ohio from 32 to 46 inches per annum. Tennessee and Kentucky have from 46 to 56 inches per annum, the same as the north half of Mississippi, and the country near the Northern Lakes, east of the Mississippi, from 24 to 36 inches per annum.

HEALTH.

If the old adage that "health is wealth" be true, Mississippi may be considered an exceptionally opulent State. It is rich in the conditions of health, and the facts will demonstrate that it is one of the healthiest States in the Union. This subject is worthy of consideration here as vitally affecting the results of agriculture. An impression prevails in some places outside of the State that Mississippi is very unhealthy. How little foundation there is for this belief will be seen by an examination of the mortality tables of the United States census. It should be remembered in this connection, that the statistics of health in Mississippi include, of course, the entire population, white and colored, and that the death rate among the colored population is quite high, being 17.28 per thousand throughout the Southern States. It is suggested in the census that the difference in mortality between the white and colored people in the Southern States is especially well marked, and is largely due to the relatively greater number of deaths among infants in the colored population. The following table of comparative statistics compiled from the census will be a sufficient answer to the assertion sometimes made that the State is unhealthy:

Annual death rate for each thousand of population.

Massachusetts	18.59
New York	17.38
Virginia	16.32
Indiana	15.77
Texas	15.53
Kansas	15.22
Pennsylvania	14.92
Illinois	14.60
Kentucky	14.39
Alabama	14.20
Georgia	13.97
Colorado	13.10
Mississippi	12.89

AGRICULTURAL EDUCATION.

In 1878 Mississippi took steps to avail itself of the munificent grant of the General Government, passed in 1862, to encourage the establishment of industrial colleges in the States "to benefit agriculture and the mechanic arts." Although the State was tardy, on account of the war and the disorganization which followed it, in adopting means to appropriate the benefits of this act, when it did begin the work it was prosecuted with an earnestness and liberality which has placed the cause of agricultural education here in advance of some of the Southern States where the system was inaugurated much earlier. The act of Congress, among other things, provided for the endowment, support, and maintenance in each State of at least one college where the leading object shall be, without excluding other scientific and classical studies, and

including military tactics, to teach such branches of learning as are related to agriculture and the mechanic arts in such manner as the legislatures of the States may respectively prescribe, in order to promote the liberal and practical education of the industrial classes. The prime object—instruction in "agriculture and the mechanic arts"—herein outlined, has, in this State, been rigidly and literally observed. Other studies are taught as a matter of course, but they are considered as secondary to these interests, and rather as instruments to more readily understand the principles which underlie agriculture and the mechanic arts.

In 1878 the legislature passed the act to establish the "Agricultural and Mechanical College of Mississippi." At that time the agricultural land scrip represented 207,920 acres, which had been previously sold at ninety cents per acre, realizing in currency $188,928, which by judicious management has been increased to $227,150, now in the State treasury, and represented by twenty-year bonds running from 1876 to 1896, and bearing 5 per cent. interest per annum. This fund was equally divided between "Alcorn University and Agricultural and Mechanical College," for colored students, which had previously been established at Oakland, Claiborne County, and the "Agricultural and Mechanical College of Mississippi," afterwards located at Starkville, Oktibbeha County, for the education of the white youth.

It will be observed that the two institutions, while kept separate and distinct, were endowed on terms of perfect financial equality. Liberal appropriations from the public funds have been made at each succeeding session of the legislature for both of these institutions, and their prosperity has been substantial and gratifying. The "Agricultural and Mechanical College of Mississippi" is presided over by General Stephen D. Lee, a practical and thoroughly earnest educator. This institution has a deep hold on the affections of the agricultural classes of Mississippi, and is destined to accomplish much good in educating and directing the minds and tastes of its pupils to agriculture, horticulture, stock farming, management of farms, manner of performing labor, and the mechanic arts. The education imparted here is also practical and illustrative; students are required not only to be familiar with labor, but to labor themselves, which, indeed, constitutes an important part of their education. The buildings are handsome, permanent, and commodious; the farm embraces 1,940 acres of land, 600 of which are under cultivation, including gardens and grounds. The farm is also well stocked with improved breeds of cattle, and with a complete outfit of the latest improved agricultural implements and farm machinery.

The average attendance of pupils has been about 300, while at the session just closed it reached 317. Students are apportioned among the several counties of the State, according to the number of educable white children, thus giving each county an opportunity for representation.

The "Alcorn University and Agricultural and Mechanical College" for colored students, is presided over by ex-United States Senator H. R. Revels, colored, who takes a deep interest in the success of the institution. Tuition is free, as in the college for whites, and the State has appropriated, in addition to the interest derived from the agricultural land scrip fund, all the money required for its successful maintenance. The average attendance is about 125.

LABOR AND WAGES.

The problem of labor lies at the very foundation of all agricultural prosperity. There can be no permanent advancement in agriculture when the labor by which the soil is tilled is indolent, uncertain, and difficult to control. Ever since the emancipation of the slaves, this great question has been anxiously and seriously considered by the planters of Mississippi. While it cannot be said that a solution has been reached, the question is not discussed as extensively as formerly. The colored people, who form the great bulk of agricultural laborers in this State, have of late years manifested a deeper interest in their own material welfare; they have taken less interest in politics; they are no longer harassed by fears that their freedom is in peril; they realize that all the rights of citizenship are accorded them, and that as long as they live in the midst of the whites there is an interdependence of interests between the two races, to an extent that whatever promotes the welfare of their white neighbors must necessarily redound to their own advantage. They begin to understand and appreciate the full force of this mutuality of interests, and with this better understanding has come a marked improvement in their usefulness as laborers. Left to themselves, and free from the influences of designing politicians, it is but just to say that they afford perhaps the best class of laborers for the large cotton fields, especially in the Yazoo delta. Many planters, indeed, consider negro labor the only kind suited to the existing methods of cotton culture, with which long experience has made them familiar.

Frequent attempts have been made to introduce labor from abroad, especially from the European countries. But little success, however, has attended these attempts, probably owing to the fact that there was no systematic and organized effort to obtain and retain this class of laborers, and the further fact that they were not introduced in sufficient numbers to overcome the objectionable competition with the colored labor already established. The difficulty was not one of climate, as has been erroneously supposed. There is no climatic bar, a fact which has been practically established. There are many instances of Swedes, and others from more northern latitudes, working successfully and without any great inconvenience throughout the hottest summer months. The main body of farm labor is, moreover, accomplished before the "heated term" comes fairly on, and besides there is generally a

Gulf breeze in Mississippi which greatly tempers the rays of the summer sun. Early corn is laid by before the hot season, while the attention which cotton requires in midsummer may be given in the cooler portions of the day.

Of course there is no difficulty of this kind in the way of native white labor, as more than one-third of the cotton product of the State is the result of white labor.

There are three systems of cultivation as respects labor in vogue among the land-owners of Mississippi, each having its advantages and defects. They are the wages system, the share system, and the rental system.

The wages plan, under which the laborer receives a certain stipulated sum by the month or year, is preferred by many farmers, especially those who labor themselves, for by taking the lead and exercising a close supervision they obtain better results than is possible under either of the other two systems. By this plan the farmer can control his labor, superintend the cultivation of the soil, and hold in perfect discipline the forces with which to make and harvest the crops, and also carry on the improvements necessary to keep the farm in good repair. It is not always, however, that laborers can be obtained on this plan. As a general thing the colored people are adverse to working for wages, preferring a semi-proprietorship, or partnership, in the products of their labor.

The following statement, taken from the table prepared by the statistician of the Department (Department of Agriculture Report, 1881–'82), presents the average monthly rates of wages by the year, with and without board, in Mississippi, for the several years named:

Laborers—	1882.	1879.	1875.	1869.	1866.
With board	$10 09	$9 28	$11 25	$11 21	$11 56
Without board	15 10	13 31	16 40	17 11	16 72

From the above it will be seen that the average monthly rates paid farm laborers for the five years named was $10.68 with board, and $15.73 without board. The rate of wages of agricultural laborers in harvest varies from $1 to $1.50 per day without board, and from 75 cents to $1 per day with board. Wages are higher in the Yazoo bottoms than in the hills. It is the practice there to furnish a certain stipulated quantity of meal and meat per week, instead of board.

The share system, originating soon after the war, is quite extensively adopted throughout the State. It is, however, considered by many objectionable, as under its operation the lands are allowed to deteriorate in value, the laborer caring little for their preservation and for future results. To this system, perhaps more than to anything else, may be attributed the slovenly and unremunerative methods of agriculture sometimes met with in this State.

When the share system is adopted the land-owner furnishes, besides the land, quarters, wood privileges, farming implements, stock and feed as an offset to the labor of the tenant. At harvest time the crops are divided on the basis agreed upon at the beginning of the year, which is in most cases one-half.

When the land-owner furnishes the supplies necessary to make the crop to the laborer he has a lien to that amount, without formality of writing, on the laborer's share of the crop, under the provisions of the existing agricultural lien law, and in like manner the laborer has a lien for his wages. In other cases the laborer gives a mortgage to the merchant on his share of the crop to secure the value of supplies advanced.

The rental system has grown quite popular with many land-owners. By this method the farms are rented for a specified amount of money, or pounds of cotton, the tenants making their own terms for supplies and assuming all risk. Under existing law this plan is quite safe for the land-owner, for he is entitled to the crop, to the exclusion of all others, as fast as harvested, until his rent is satisfied. The rent on the rich bottom lands of the State are sometimes as high as $8 and $10 per acre. The average there is about $6.50 per acre. The cost of keeping plantations in repair falls entirely upon the land-owner.

As to the earnings of the laborer, of course, much depends upon the character of the soil, season, markets, and the prudence and energy exercised in cultivation. One thing, however, may be said of labor in Mississippi—the prudent and industrious laborer need not long remain simply a laborer, as the rewards of labor are nowhere more certain; land is cheap and easily secured, can be bought on long credit, and in a brief time the frugal and industrious laborer becomes himself a landed proprietor.

THE AGRICULTURAL LIEN LAW.

The farmers of Mississippi, when they began to repair their fallen fortunes after the civil war, found themselves bereft of all but landed property. Cotton commanded a high and remunerative price, but everything the producer had to buy was high in proportion. The temptation to devote all time and resources to the production of this crop, which brought ready cash at all times, was too great to be resisted. Everything was made subservient to the all-cotton idea, and the farmer's smoke-house, corn-crib, hay-stacks, and almost his vegetable garden were in the Northwest. The profits of manufacturing his cotton were realized in the East, while the little remaining at the end of the season, after long months of toil, went to the West, and to swell the profits of middlemen who handled the supplies which were furnished. Cotton gradually declined in price from year to year, and the burden of debts, contracted under the system of high credit prices, rather increased than diminished, for when each crop was marketed the yield and prices were

hardly sufficient to pay the cost of production. Strange to say, however, the same plan was followed the next year, in the hope of better prices, and with like result.

Out of this system of farming on advances, grew the agricultural lien law, which allowed the pledge of a crop months before a single furrow had been run for its production. Compelled to borrow money, or secure advances of supplies, from the beginning of the year almost to its very close, the farmers had to obligate themselves to plant enough cotton to secure the party making the advances, and when this was done there was small opportunity for the production of home supplies. No doubt the well-known fascinations of credit contributed its share to swell the year's expense account, but, above all, the extremely high-credit prices charged, on account of the risk incurred, tended greatly to consume the entire value of the mortgaged crops. As a matter of course, there were many farmers with credit or capital who did not resort to this system.

It is gratifying to state that in this respect great improvement has taken place in recent years, but, illustrating the difficulties encountered by farmers in the past, the following from Hon. J. F. Henderson, commissioner of agriculture for Georgia, which is equally applicable to this State, is to the point:

> Corn sells at the average price of 89 cents per bushel cash, and $1.12 "on time." This is simply a ruinous policy; no legitimate business can pay such rates of interest and prosper. Farmers cannot afford to pay 89 cents cash a bushel, and yet they are paying "on time" 54 per cent. per annum on the cash price. Offer to lend a man money at 54 per cent. per annum, or 4½ per cent. per month, and he would feel that his intelligence was insulted, and yet he buys corn, agrees to pay 54 per cent. per annum on the cash price, and mortgages his property to secure the payment of principal and interest. Similar rates are paid on bacon and hay, which could and should be produced on the farm. The cities were formerly fed by the country; now the country is fed from the cities. This is an unnatural and abnormal condition of things that must be reversed, or it will bring disaster upon both country and city.

As before remarked, this applies mainly to the past in this State, for much more attention is now being paid to the production of home supplies. There was very little corn purchased from abroad the present year, and in the prairie region, in the northeastern portion of the State, the supply was so great that it found dull sale at 35 and 40 cents per bushel in midsummer.

The agricultural lien law, as it exists on the statutes to-day, may be best considered under three well defined heads.

I. LIEN OF LANDLORD.

This act gives every lessor of land a lien on all the agricultural products of the leased premises to secure the payment of rent and the fair market value for all supplies or advances made to the tenant, and to others for whom the tenant may contract. This lien is made paramount to all other liens, claims, or demands upon the products, and ample pro-

vision exists for its ready enforcement, due regard being also had for the rights of the tenant, and his protection against imposition.

II. LIEN OF EMPLOYER AND EMPLOYÉ.

By this provision every employer has a lien on the share or interest of his employé in any crop made under such employment, for all advances of money, and for the fair market value of all other things advanced to him, or any one at his request, for supplies for himself, his family, and his business. On the other hand, every employé, laborer, or cropper, or other person who aids by his labor to make or prepare for market any crop, has a lien on the interest of the person who contracts with him for such labor, for his wages or share in such crop, whatever may be the kind of wages or interest. Such liens are made paramount to all liens or incumbrances, or rights of any kind created by or against the party contracting for such assistance, except the lien of the lessor, mentioned above. These liens exist by virtue of the relation of the parties, or employer and employé, without any writing, and there is appropriate provision for their prompt enforcement.

III. MORTGAGES ON GROWING CROPS.

The authority for mortgages of this nature exists in the following words:

> It shall be lawful for persons to make and execute mortgages, or deeds of trust, upon growing crops, or crops to be grown within fifteen months from the making of such mortgage or deed of trust, which encumbrance shall be valid and binding upon the interest of such mortgagor or grantor in such crop, but shall not be, in any case, prior to the liens provided for in "an act in relation to landlord and tenant," and "an act in relation to the lien of employers and employés."

The two provisions of the law mentioned first, numbered here I and II, judging from public expressions, are unobjectionable, operate satisfactorily, and are wise enactments under existing systems of agriculture. There appears to be no demand from any quarter for their repeal.

The last provision quoted, however, is the subject of controversy, and has been attacked and defended with considerable zeal for a number of years. There seems to be a growing desire for its repeal, and the coming legislative session will no doubt make it the object of earnest consideration. It is generally admitted to have been a wise measure at the time of its adoption, but there are not a few who believe that it has outlived its usefulness, and that it is now productive of more evil than good.

Those who advocate its repeal contend that it demoralizes labor; creates a fictitious credit, not based on a man's integrity and ability to pay; encourages extravagance; pledges in effect the bone and muscle of the producer, and is therefore vicious; acts as a barrier to a natural credit; causes careless tillage of the land, resulting in its depreciation and ultimate exhaustion; tends to the exclusive cultivation of cotton,

to the neglect of diversification and food production; offers a temptation to speculation, and an encouragement to improvidence; places the producer completely in the hands of the party making advances, thus compelling him to pay exorbitant prices that losses under the system may be offset, and finally acts as an encouragement to those who are unable to intelligently cultivate the soil to become tenants, to the general detriment of themselves and all landholders.

Those who oppose the repeal, on the other hand, reply that the necessities of the people require its continuance; that many small farmers would suffer if deprived of this means of obtaining credit; that the law is not compulsory, and it is only the abuse of the system that is injurious; that its repeal would not put an end to the credit system; that landholders would be obliged to mortgage their lands for supplies for tenants more extensively than at present, and that its repeal would in many ways impose additional burdens on the landholders, and redound to the benefit of speculators.

These are about the arguments *pro* and *con*, but aside from these, it must be admitted that the sentiment in favor of the repeal of this branch of the agricultural lien law appears to be yearly increasing and gaining in popular favor. If the law is to be repealed, it would seem prudent to provide for the repeal to take effect at some certain reasonable time, so that parties interested may have due notice, and opportunity to make preparations for the change.

EXTENT OF THE SYSTEM.

It is to be regretted that there are no official figures available to show the actual extent of this system of agricultural liens, and to indicate whether it is on the increase or decrease. As far as known, no compilation of the total number and amount of these liens, in existence in the State in any one year, has ever been made. They exist upon record in the different counties, it is true, but they are frequently mixed with mortgages on other things, or are executed for some certain sum, and "such other and further advances as may be hereafter made." This latter is an unknown quantity in any calculation of the kind, and difficult to determine. It is therefore next to impossible to arrive at anything more than an estimate of the extent of the system. The official figures for Lincoln County have been obtained, and they will be used as a basis to calculate an estimate for the entire State. The number of agricultural and mixed deeds, wholly or partly on growing crops, in this county is as follows:

Years.	Total number.	Total amount.
1882	693	$93,459
1883	686	102,871

This shows a decrease in number of seven, and an increase in total amount of $9,412. Lincoln County produced in 1879, 6,286 bales of

cotton, which, at $45 per bale, would amount to $282,870. If the production this year is the same, it will require more than one-third of the cotton crop to cancel the amount of this class of liens as given in the above figures.

Let us apply the figures to the entire State. The population of Lincoln County at the last census was 13,547. There are 74 counties in the State, and the average population by counties is 15,291. It therefore appears that Lincoln County is not up to the average in population, and it seems fair to infer that the number and amount of the mortgages in the other counties of the State will at least average as great as the number and amount in Lincoln County. Estimating the State upon this basis would give the number of mortgages, wholly or partly on growing crops, in the State, as 50,764, and a total amount of $7,612,454. These figures, large as they appear, do not probably overestimate the extent of the system, for, as before observed, the population of Lincoln County is below the average, and there is no reason to believe that the system is more in vogue there than generally throughout the State. Besides, no account has, or can be, taken of the supplies advanced beyond the amount named in deeds of trust, and this must be considerable.

The value of the cotton crop of Mississippi in 1879, at $45 per bale, amounts in round numbers to $45,000,000. The yield this year, on account of an unusual and long-continued drought, will probably be at least 25 per cent. less than in 1879, making the value of the cotton crop about $8,000,000 less, or about $35,000,000. Taking the estimate of the amount of agricultural liens above given as correct, it will require at least one-fifth, or 20 per cent., of the entire cotton crop to cancel them.

What part of this large sum—$7,612,454—representing the agricultural liens in the State goes to the profits of parties making advances it is difficult to determine, but it is thought to be not much under one-half.

COTTON PRODUCTION.

The production of cotton must, in the very nature of things, ever remain one of the leading industries of Mississippi. The agricultural conditions of the State are especially favorable for the culture of this staple crop, while all the habits and traditions of its labor and of its landholders lead in this direction.

Diversification of products is undoubtedly one of the pressing needs of the times, and there are ample scope and facilities for such diversification without trenching materially upon the yield of this great product. As suggested by Mr. Edward Atkinson, the demand for cotton goods must continue to keep pace with increasing population and wealth, and the new purposes to which the fiber is constantly being applied. The world must depend upon the limited area where the staple can be successfully grown for its supply, and Mississippi, with its favorable soil

and climate, and its great, rich, alluvial Yazoo delta will always be an important factor in cotton production.

It is not yet quite a hundred years since the cultivation of cotton was really begun in the United States. In 1719 it was suggested that the climate of South Carolina was favorable for its production, yet more than half a century elapsed before much attention was given to the subject, when, in 1775, the first Provincial Congress of that State "recommended to its people to raise cotton." Georgia is said to have taken the lead in its introduction and cultivation. As showing the period sometimes required to introduce a new product, it may be mentioned that it was not until 1785—65 years after its cultivation was suggested—before the first shipment was made, when eight bags were seized by the custom-house officers at Liverpool, it not being credited that even the small quantity of two thousand pounds had been raised in the United States. Seed was introduced in Georgia from Jamaica and Pernambuco in 1786, and the upland, or Georgia variety, was successfully introduced about the same time. As is well known, the cultivation of cotton was insignificant until Whitney invented the cotton gin, when the value of the crop in the United States increased in ten years from about $150,000 to at least $8,000,000.

The production of sea-island cotton has, in Mississippi, been confined to a very few plantations on the coast. The area suited to its growth is very limited, and, while it bears a much better price than the ordinary cotton, its production in Mississippi has never assumed much importance.

Many accidental and excellent varieties of cotton have been introduced, and have been preserved and further improved by a careful and judicious selection of seed in the field. At the same time many worthless and spurious kinds have been palmed off on planters, bearing, usually, high-sounding names, which enjoyed a brief and fictitious reputation.

The long-established method of cotton cultivation is too well known to require detailed description here. It usually takes from six to eight furrows to get the land prepared and the seed planted, and four plowings and two or three hoeings to get the crop in condition to "lay by." A thorough and proper preparation would require a dozen or more furrows to get the land in the desired condition for the seed.

Cotton-picking, like type-setting, is still performed by the fingers, no invention yet having been introduced to do the work in a satisfactory manner. Should one be constructed to meet the requirements it would be a great saving to farmers, and very materially enhance the profit of production, as fully one-third of the cost of making cotton may be charged to the gathering. It is worthy of note, however, that a hand can pick more cotton in a day now than formerly. Many years ago fifty pounds a day was considered good work; now two hundred pounds can easily be picked, while there are a few persons who gather three and four hundred pounds in a day.

In an average of ten years, in which observations have been recorded in this State, the first cotton-blooms made their appearance about the first of June, and the plant was killed by frost about the first of November.

Prof. E. W. Hilgard, in his cotton returns to the United States Census, has this to say about cotton production in Mississippi:

> Mississippi stands first in total production, while sixth in population, among the cotton States. (See table from United States Census.) At first blush, in view of the great fertility and large area of the Mississippi River and Yazoo River bottoms, within the limits of the State, the inference would be that the high position of the State's production is due to these fertile bottom lands. But a detailed discussion of the areas of production shows that a little over one-fourth (27 per cent.) of the cotton product of the State comes from the Mississippi and Yazoo River bottoms, while over one-half of the whole is produced in what might be termed the first-class uplands, viz., the table land belt bordering the Mississippi bluffs, the yellow loam region, and the two prairie belts. The remaining one-fourth is grown scatteringly over the sandy uplands, bearing more or less of the long and short-leaf pine that form nearly half the area of the State.
>
> It thus appears that the high production of Mississippi is due to the fact that quite one-half of its territory is occupied by soils of exceptional fertility, coupled with the circumstance that cotton culture is the one pursuit to which the population devotes itself.

Mississippi increased its cotton product more than 70 per cent., or 398,173 bales, from 1870 to 1880. This great increase in ten years shows the capabilities of the State for cotton production. The value of the total crop in the census year was more than $43,000,000, or nearly $40 for each unit of population. The total number of acres in cotton at the same time was 2,093,330; close on to one-half of the entire improved land in the State. The total product was 963,111 bales, of which 328,568 bales were the product of white labor. The average yield per acre throughout the State, as mentioned elsewhere, was 0.46 of a bale, or 190 pounds of lint cotton, being a higher yield than in North Carolina, South Carolina, Georgia, Florida, Alabama, and Tennessee. Issaquena County makes the largest average yield, per acre, of any one county, being 0.88 of a bale. Other river counties follow with an average yield almost as great, while a single acre frequently produces a bale and a half to two bales, without fertilizing.

It is a question much debated among farmers whether it pays to raise cotton at the low prices which have prevailed for several years. A great many contend that it does not pay, but often these are the very producers most wedded to its culture. It therefore happens that at each planting season there is much talk about decreasing the acreage in cotton, which more frequently ends in an increased acreage than otherwise. One planter will often advise his neighbors to plant less cotton, arguing that it does not pay, and at the same time quietly make arrangements to increase his own acreage, in the vain hope that the annual product will be less and prices higher than usual. Many produ-

cers acting on this hope, the result is, of course, increased production and poor prices. If there is really a desire to reduce the production of cotton, it will be best accomplished by the introduction and production of other crops, and the diversification of industries generally throughout the cotton belt. This seems difficult to accomplish at once, and there remains the one practical plan for each individual farmer to adopt, and that is to improve the culture, increase the yield per acre, and by these means lessen the cost of production.

Under the present system of farming on advances, many farmers cannot well produce less cotton if they desire to do so. They are bound up to the merchant by debt and mortgage, and to secure further necessary advances with which to continue their farming operations they must at the beginning of each season promise to devote their main attention and resources to the cotton crop. No doubt many who would be glad to diversify their crops are deterred by this obstacle. This class of farmers can, however, adopt the method here suggested to make cotton production pay, and thereby remove this barrier to their advancement. It will pay, and pay well, to make cotton, even at present prices, if improved and intensive cultivation is adopted, but it is difficult to show where the profit comes in when, as is often the case, it takes from three to six acres to produce a bale.

An effort has been made by the writer to determine, approximately at least, the cost of cotton production. This is well nigh impossible, as so much depends upon the character of the soil, the seasons, the method of cultivation, the price of food, &c. The most that can be done in this respect is to submit the experience of several intelligent farmers in different portions of the State, with their opinion as to the cost of production.

Mr. Will. E. Collins, residing on Steele's Bayou, Issaquena County, says:

I can only estimate the cost of one bale of 450 pounds, the usual yield per acre here. I submit the estimate as made up from my crop-expense account, to-wit:

Basis, one acre; yield, 450 pounds lint:

Preparing land for seed	$2 50
Planting	3 00
First plowing	1 25
Second plowing	1 00
Third plowing	1 00
First chopping	1 50
Second chopping	1 50
Laying by	1 50
Ginning	1 00
Picking	7 50
Hauling	75
Total	22 50

Total cost to make 1,400 pounds seed cotton, or 450 pounds lint ready for market, $22.50, or 5 cents per pound. The cost, of course, differs under different systems of working, the above being the cost to make under the wages system, the only true system in any business. Under the share system the cost would increase fully 2 cents per pound, because the yield per hand would be much less. Of course when the yield even under the wages system is less than 450 pounds lint per acre, the cost would increase in proportion, but the usual yield here being 450 pounds, the estimate is a safe one.

This estimate makes a very good showing for the rich alluvial bottoms, where a bale to the acre can be easily made without fertilizing. Let us apply the figures to the entire State and see the result. The average product per acre in Mississippi is, as we have seen, 0.46 of a bale, or 190 pounds of lint cotton. Every item in Mr. Collins's account would be the same for making 190 pounds as it would be for making the 450 pounds, excepting the gathering and ginning, which would reduce the total cost per acre to about $17.95, and make the cost of production about 9.44 cents per pound. The conclusion seems to be irresistable that when the yield falls below half a bale to the acre there cannot be much money in making cotton at present prices.

Mr. W. R. Bridgforth, of Pickens Station, on the Illinois Central Railroad, gives the following estimate of the cost of making a 450-pound bale of cotton in his section of the State:

With favorable seasons we produce a bale on from 2 to 3 acres; otherwise it takes from 3 to 5 acres. It costs at least 6 cents per pound to produce cotton with us, and this does not include loss, wear and tear of tools and implements, nor does it include the land rent, which is from $2 to $5 per acre; hence I think the total cost will be at least 7 cents per pound, or $31.50 per bale of 450 pounds.

Mr. F. J. Hunter, of Sardis, on the Mississippi and Tennessee Railroad, says:

I have had several planters to make estimates, some of whom claim it has cost 8½ cents per pound to raise cotton; some more, some less. I think the following estimate is about the average:

Estimated cost of cotton.

120 acres land, rent at $4		$480 00
Five mules, rent		125 00
Use of tools		50 00
Superintendence		125 00
		780 00
Yield, 40 bales, or pounds of lint		20,000
Labor gets one-half	pounds	10,000
Landlord's share	do	10,000
Cost per pound	cents	$7\frac{8}{10}$
Total		$780 00

Corn and other things raised will return feed for stock, &c.

Mr. G. T. McGehee, of Glen Burnie plantation, Wilkinson County, furnishes the following itemized statement:

Cost of making cotton, per pound and per bale of 450 pounds.

Items.	Man.	Team.	Total.
Breaking up 1 acre	$0 50	$1 00	$1 50
Planting 1 acre	10	20	30
Barring off 1 acre	20	40	60
Molding 1 acre	20	40	60
Hilling with plow 1 acre	20	40	60
Second hilling with plow 1 acre	20	40	60
Plowing out (last time) 1 acre	30	60	90
Scraping with hoe 1 acre	50		50
Hilling with hoe 1 acre	50		50
Seed to plant 1 acre			40
Rent of 1 acre			3 00
Cost of 1 acre			9 50
Cost of 3 acres			28 50
Picking 1,600 pounds seed-cotton, at 50 cents per 100 pounds			8 00
Ginning, at ½ cent per pound lint			2 25
Bagging, ties, and twine			1 30
Total cost 1 bale of cotton 450 pounds			40 05
Cost per pound			$08\frac{9}{16}$

I estimate 150 pounds lint to the acre, which is a fair yield under *usual* cultivation.

Mr. W. L. Clayton, of Tupelo, on the Mobile and Ohio Railroad, makes the following estimate of cost of making cotton by the share system, which is the usual plan in that county:

By this system one horse will make on an average three 500-weight bales of cotton, or 1,500 pounds of lint cotton, and enough corn and fodder to the owner's part for horse's feed. The tools to make the crop, repairing, rent of horse, superintendence, &c., will cost $42.50. The landlord will receive as his share one-half, or 750 pounds of lint cotton, at the cost indicated above, or 5⅝ cents per pound.*

It is evident from the above statements, which are probably below the average cost of making cotton in the State, that there is not much money in its production by the old methods. Many farmers are compelled to obtain their supplies for making a crop at high credit prices, which very much enhances the cost. As before suggested, the true plan would seem to be to improve the cultivation, and thereby increase the yield per acre. How far this may be done will appear from the following facts, furnished by Mr. C. D. Kelly, of Winona, Montgomery County:

In 1881 I manured 3 acres of ordinary branch land with 1,000 pounds of bone-dust and 100 bushels of cotton-seed to the acre, prepared the land deep, and planted Osier seed the first of May. I cultivated as usual, and gathered a little over 6 bales on the 3 acres. In 1882 I planted the same 3 acres the 4th of May, used one-third of the amount of manure used in 1881, and gathered a little over 5 bales on the 3 acres.

These facts are full of meaning. They suggest to the farmers of Mississippi how cotton production can be made to pay, and pay well, while the quality of their lands is constantly being improved.

As showing further the results of intensive cultivation, an instance which occurred in Carroll County the present year is worthy of note. Four farmers entered into a friendly contest to see which could make

* To the profit side of all calculations should be added the value of the seed, which amounts to $5 or $6 in a 450-pound bale of cotton.

the best yield of corn on an acre. Upon careful measurement it was found that two of the number had each produced 87½ bushels to the acre, and this in an exceptionally dry season. Cotton seed and a small quantity of bone-dust were the fertilizers used.

THE USE OF FERTILIZERS, MARLS, ETC.

With the growing disposition among farmers to discard old methods and to adopt well-approved agricultural processes has come an increase in the use of commercial fertilizers, marls, and home-prepared manures. The era of restoration of exhausted soils and the preservation of the fertile lands of the State, too long delayed, is now fairly inaugurated, and it is expected that there will hereafter be a large annual increase in the use of these means, promising results of the highest practical importance. More attention, especially, is being paid to the care, collection, and application of stable or barn-yard manure, which costs but little time and no money, and which, by itself, supplies all the ingredients necessary to insure permanent and active fertility. It is said that European agriculturists consider that any one who even sells the manure which accumulates on his land, instead of returning it to the soil, is fast ruining his estate. The agriculturists of Mississippi have not yet reached that point of appreciation for the materials necessary to keep their soil fertile and to restore already exhausted lands, but the improvement in this respect is notable and promises well for the future.

The materials for cheap and ready fertilizing are abundant throughout the State. There are many beds of marl, calcareous and gypseous, marsh and pond muck, lignitic clays, and other substances suitable for composting, and above all is cotton seed, and its product cotton-seed meal, which have no rivals as fertilizers. The valuable purposes to which cotton seed may be now applied are such that the seed is no inconsiderable part of the profits of a crop. Many years ago cotton seed was looked on as a nuisance, and often attempts were made to get rid of it by burning in a heap, the planters seeming to entertain no suspicion of its value as an application to the land. It is said to have been a common practice with the planters of the Mississippi bottom, with whom cotton seed was a drug, to get rid of it by hauling it to the bayous, where a part was eaten by the hogs and the rest washed away. The stalks also were generally pulled up or knocked down and burned on the field.

Cotton as a crop, when nothing but the lint is actually taken from the land, is one of the least exhaustive of crops known. The amount of mineral ingredients in a 400-pound bale of cotton is no more than is contained in 7 or 8 bushels of corn; less by 20 to 25 bushels than it is usual to raise on land which will bring a bale of cotton to the acre. But if the seeds and stalks are not returned, the amount of mineral ingredients withdrawn from the soil is fully twice as great as that which is contained in a corresponding corn crop. Twelve hundred and seventy-five pounds of seed cotton—assumed as yielding a 400-pound bale of cotton—contain about 42 pounds of mineral ingredients; of these 4 pounds only

belong to the lint, and represent, therefore, the necessary exhaustion of the soil, while 38 pounds belong to the seed. It therefore appears that when the seed, stalk, and leaves are conscientiously returned to the soil the exhaustion from successive cotton crops is very slow indeed.

The manufacture of cotton-seed products is largely on the increase in the State. There are mills in operation in most of the larger towns, and new ones are continually being erected. It is an industry that merits encouragement in the State. Very little, if anything, is lost to agriculture by the extraction of the oil from the seed, as it contains only a trifling amount of mineral matter. Planters should insist, however, on having the cotton-seed meal returned to them, as it contains the ingredients which form a valuable and highly concentrated fertilizer. It decomposes more rapidly than the seed, is in a more favorable condition for application, and is considered much superior as a fertilizer. It is also a valuable feed for stock. The ashes of the hull make a fine fertilizer, and thus by the establishment of cotton-seed oil mills the entire product of the seed may be utilized to the greatest advantage. Prof. Charles W. Dabney, jr., of the North Carolina agricultural experiment station, says that the oil is of comparatively little value in the cotton seed as a feeding stuff, a sufficiency always remaining after the kernels have been pressed and the cake ground into meal, and it is of no value whatever as a manure. Also that the hulls are of comparatively little value as a feeding stuff, and can be used either as a fuel, producing an ash very rich in potash and phosphoric acid, or may be used as a litter for animals. Dr. Charles N. Shepard, jr., chemist of the department of agriculture of South Carolina, gives the following analysis of a sample of green short-staple cotton-seed meal:

	Per cent.
Moisture	7.40
Organic matter	86.98
Fixed ingredients (ash)	5.62
	100.00
Ash as above contains:	
Phosphoric acid	2.17
Sulphuric acid	0.34
Potash	1.52
Sand	0.31
Organic matter as above contains of—	
Ammonia (potential)	9.50
Oganic matter contains of oil	13.40
The oil found in the above is of no use as a fertilizer.	
Commercial value of the above article, per ton of 2,000 pounds, according to valuations of South Carolina department of agriculture for season 1881–1882:	
190 pounds potential ammonia, at 25 cents per pound	$47 50
43.4 pounds phosphoric acid, at 10 cents per pound*	4 34
30.4 pounds potash, at 6 cents per pound	1 82
Value of 2,000 pounds cotton-seed meal	53 66

* It is assumed that the phosphoric acid contained in cotton-seed meal is as available as the so-called "*reduced*" phosphoric acid in the fertilizers.

A ton of cotton-seed meal is considered as valuable as at least three tons of the seed for fertilizing. If farmers simply have the oil pressed out of their seed, the establishment of cotton-seed oil mills will increase their profits, but if they part with the meal, and do not apply it as a fertilizer, the mills will do a great harm rather than a benefit.

As a natural consequence from the foregoing facts, cotton seed have gradually advanced in price, and the competition among seed-buyers where there are transportation facilities, or oil-mills, is often quite animated during the fall and winter. The price for seed fluctuates considerably owing to the combination of various seed associations and mills, ranging from $5 to $21 per ton. Seed is selling at present to the oil-mills at Vicksburg at $10 per ton.

The oil has become a valuable article of commerce, being extensively used in the place of or in connection with lard for domestic purposes. It is also considered a first-class substitute for olive oil. When refined and allowed to cool, the oil becomes white and of the consistency of lard to such an extent as to defy detection from all but an expert.

In order to protect planters from imposition in the use of commercial fertilizers, and to determine their value, the last legislature passed an act to provide for an analysis of each and every commercial fertilizer offered for sale in the State, to be made by the State chemist. Each manufacturer and vendor is required to display this analysis in a conspicuous place in his office or place of business.

Prof. John A. Myers, professor of chemistry in the Agricultural and Mechanical College, State chemist, furnishes for this report the following on—

THE MARLS OF MISSISSIPPI.

Marl is a term that is applied to "clay containing a large proportion of carbonate of lime." Its value as a fertilizer depends chiefly upon the amount of potash and phosphoric acid it contains. The carbonate of lime, however, acts indirectly by correcting the acidity of the soil. This acidity is due to the decay of vegetable matter in wet localities where the air does not have free access, or where the water in the soil does not drain off. Soils in such localities are usually deficient in lime, and the addition of some marl frequently produces astonishing results.

Carbonate of lime also acts in such a way as to enable the soil to supply such a quantity of silicates as is required for many of the crops. This effect is produced by causing the soil to abstract the soluble silica from the solution and to retain it in the soil. Lime in the soil also aids in the decay of vegetable matter to form a large amount of valuable humus. This humus gives the soils the dark color so peculiar to our prairie regions. It is, however, largely true of other dark soils. These dark-colored lands are seldom wanting in lime, and the addition of lime to them is like carrying coals to Newcastle. The presence of lime in the soil also has a tendency to check drought, and to prevent injury from excessive wet weather.

The value of the marl beds to the agriculture of Mississippi is very great, and when the proper conditions for its use are observed, marl will be found to be one of the most useful of fertilizers at the command of the farmers.

It will not do, however, to expect too much of it. The only elements in the marl that have any direct value as fertilizers are the phosphoric acid and potash. The marls of Mississippi, upon an average, have only 0.171 per cent. of phosphoric acid, and 0.807 per cent. of potash. So that it is evident that the greater part of the ele-

ments which act directly will be very soon exhausted. We may add here that, ordinarily, it will not pay to haul marls any great distance. The chief value of the marls lies in their indirect action upon the soil, as has been explained. The use of marl in the Prairie Region is scarcely profitable. The soil already has from 8 to 15 per cent. of carbonate of lime. It will therefore be much better to use an acid phosphate and some potash compound, as kainite, wood ashes, or cotton-seed hull ashes. For it is evident that the soil already has an abundance of lime, and requires the more active elements for plant growth. It is true that an application of 200 pounds of marl per acre even upon these lands produces a marked effect upon vegetation, but it is due more to the phosphoric acid and potash present in it than to the lime.

The marls of Mississippi may be divided into four classes, viz., fresh-water marls, clay marls, marine marls, and cretaceous marls.

I. The *fresh-water marls* are found in the sites of lakes in the Mississippi Bottom, and are sometimes designated "lake marls." (See Professor Wailes' first report, p. 231.)

II. *Clay marls.*—These are irregularly distributed through the southern portions of the State. They are quite rich in potash and carbonate of lime, but do not have a large amount of phosphoric acid. They contain no distinct shells, and usually appear as heavy gray or blue clays, which, when exposed to the action of the atmosphere for some time, crumble to powder. This marl has little effect except upon sandy soils, or those requiring to be made heavier and closer.

III. *Marine marls.*—These belong to the Tertiary formation, and extend across the State from Vicksburg, past Jackson and Enterprise, to Alabama. It has considerable width, and the marl is of quite variable composition. It is, however, usually very rich in carbonate of lime, and has above the average amount of potash and phosphoric acid. The white marls of this formation are usually richer in lime than the green and blue marls, which have less carbonate of lime and more potash and phosphoric acid. There are some green sand marls belonging to this formation which are more abundant in the Jackson group than elsewhere.

IV.—*Cretaceous marls.*—Of these there are at least three classes.

(*a*) Green sand marls of the Upper Cretaceous formation. These are of a bluish or greenish-gray tint, sandy character, contain about 15 per cent. of carbonate of lime and 0.75 per cent. of potash. They are distributed through North Chickasaw, Pontotoc, Union, Tippah, and Alcorn Counties.

(*b*) Clay marls contain from 20 to 80 per cent. of carbonate of lime, and shade gradually into rotten limestone. They contain about 0.75 of 1 per cent. of potash and a small per centage of phosphoric acid. The insoluble portions of these marls consist of clay. When freshly thrown out they most frequently have a blue color.

(*c*) The greenish sands. These are especially abundant along the Tombigbee and its tributaries, and have little value as a fertilizing material. Several samples sent to my laboratory for analysis proved to be so poor in quality that it would scarcely pay for hauling out upon land.

It is well for the farmer to know the composition of the marl that he is using, or in many cases he will be disappointed.

COTTON AND WOOLEN MANUFACTURING.

The agricultural prosperity of a State, if not dependent upon the development of manufactures, is greatly promoted and advanced by their success and number. They create a ready, accessible market for the raw material manufactured, and a demand also for other products of the farm for the sustenance of their operatives. When factories abound the planters of this State will have little trouble in disposing of many of their surplus products for which there is at present no market. Upon the article manufactured the producer will save the charges and profits of middlemen, and transportation companies no inconsiderable

burdens upon the staple products of the soil. To the extent, therefore, that the products of a State are manufactured within the limits of that State the entire profits in the successive stages are kept within the State, and all callings and trades feel the beneficial effects, but none more so than that of agriculture.

The press and people of this State are thoroughly alive to the importance of manufactures and the advantages which result to a community from their establishment. Never before in the history of the State has there been manifested such a lively and growing interest in this important subject. The governor of the State, in his inaugural address, called special attention to the importance of manufactures, and the legislature, at its last session, passed a law exempting from taxation for ten years the machinery used for the manufacture of cotton and woolen goods, yarns and fabrics composed of these or other materials, or for the manufacture of agricultural implements and machinery. This sentiment takes practical shape every now and then in the incorporation of a company of home capitalists to embark in cotton or woolen manufacture. And here it may be remarked that there is probably not a county in the State whose citizens could not, by organization and co-operation, establish, without any foreign aid, a well equipped manufactory for the production of the coarser cotton fabrics. It is a common remark that capital is scarce in Mississippi; the truth is, there is a fair proportion of it here, only it is very widely and evenly distributed, and needs co-operation to bring it together for industrial and manufacturing advancement. When the people of the State fully appreciate the vast benefits of combined capital and effort they will not long wait for outside capital to aid them in establishing manufacturing industries. There may not be one or two individuals in a given community able and willing to invest $100,000 in a cotton factory, but two hundred might be found who would invest $500 each, thus making the required amount. These figures are, of course, merely illustrative; the capital need not be so large for a beginning, and consequently the individual subscriptions would be less.

The present healthy sentiment in favor of manufactures promises well for the future, and it is a reasonable assumption that Mississippi, occupying a position among the first of the cotton-producing States, will, in the near future, take high rank in the manufacture of her favorite and staple product. A well-settled conviction exists throughout the country that the coarser fabrics, at least, should be manufactured close by the fields where the raw material is produced. "Bring the mills to the cotton" is now one of the popular ideas of the day which is gradually assuming practical realization. It is very generally admitted that the mills established in the cotton belt will soon have the market under control for the coarser grades of cotton goods. Those who have engaged in cotton manufacturing in this State have wisely concluded to devote themselves to this class of goods for the present. This is the proper and necessary

beginning; what possibilities the future will develop is left to conjecture.

There is little fear of overproduction of cotton goods, however much manufactures may multiply in the South. Mr. Edward Atkinson, of Boston, an eminent authority on this subject, says:

When it is remembered that a larger portion of the population of the globe is now clothed in cotton fabrics made by hand, and that even those who use machine-made fabrics are served as yet with less than half as much cloth as the people of this country average in a year, the future field for industry and commerce in this department may be imagined, but cannot be proved by statistics, or by any deductions from census data.

The requirements for successful cotton manufacturing abound in Mississippi. The raw material is here in first hands; there is an abundance of cheap fuel; the cost of living is less than in the large manufacturing centers; the hours of labor are longer; there is an abundance of cheap water-power, when it is preferred to steam; all capital invested is exempt from taxation for ten years; a home market exists for a part of the products, and finally there are rail and water transportation facilities from many sections of the State to the great centers of trade and commerce. These are the inducements held out to foreign investors, and the further important fact that manufactures in Mississippi, built and operated with home capital and home labor, have prospered to a gratifying extent, and have paid handsome interests on the investments. Those who are inclined to doubt that manufacturing may be made to pay well in Mississippi have only to notice the results already accomplished.

Thirty-five years ago, at the present site of Bankston, Choctaw County, Col. J. M. Wesson put in motion the first spindle and spun the first yarn that was ever made by steam or water power in Mississippi. This pioneer in manufacturing was president of a company organized at Columbus, Ga., and the enterprise established at the interior site, Bankston, proved very profitable until destroyed during the war.

The extent of the mechanical and manufacturing interests of Mississippi, at the last census, is exhibited by the following statement:

Description.	Number of establishments.	Capital.	Average number of employés.	Value of products.
All industries	1,479	$4,727,600	5,827	$7,518,300
Cotton goods	9	1,130,640	722	691,415
Flouring and grist mill products	525	889,950	848	1,762,523
Lumber, sawed	295	922,595	1,170	1,920,335
Oil, cotton-seed, and cake	8	450,000	509	560,363
Woolen goods	8	331,500	218	299,605
All other industries	634	1,002,915	2,360	2,284,006

The figures above quoted have been very materially increased since the census was taken by the establishment of new industries and the enlargement of old ones.

WHAT SOME MISSISSIPPI MILLS ARE DOING.

A conspicuous example of what may be done in manufacturing in this State is afforded by the Mississippi Mills, located at Wesson,

Copiah County, on the Illinois Central Railroad, 138 miles from New Orleans. These mills commenced operations under their present organization in 1873. The site selected was, previous to the establishment of the mills, almost an unbroken pine forest. To-day Wesson is a beautiful, prosperous manufacturing village, of which there should be many counterparts in Mississippi, containing free schools and churches and about 2,800 inhabitants, more or less dependent upon the prosperity of the mills. Mr. E. Richardson, the president, and an extensive cotton-planter, and Mr. William Oliver, the secretary and treasurer, are both Mississippians, and the 900 operatives are mostly from the surrounding country.

At the Centennial in 1876 these mills received the highest award of merit, and medal for their celebrated "Centennial cassimeres," and at the Atlantic Exposition they again received the highest award—diploma and gold medal—for the superiority of their goods. Every year since the present organization the mills have prospered and made money, but the management have steadily invested the earnings in buildings and machinery. Within the past six months very near $100,000 have been thus invested. There are 500 looms and 10,000 spindles in operation, and also thirteen sets of woolen machinery, and all the appurtenances of a first-class woolen mill. A variety of goods are manufactured, such as cotton checks, plaids, ginghams, cottonades, brown sheetings, shirtings, osnaburgs, drillings, tickings, jeans, cassimeres, yarns, threads, &c. The mills consume about 4,000 bales of cotton and 900,000 pounds of wool per annum. Wood fuel is used, of which there is a convenient and abundant supply. As to the demand for the products of the mills, the secretary says:

> We are generally overworked on all our fabrics, and have orders now largely in excess of our production of woolen goods, and on many of our cotton goods. Our trade extends from New York to San Francisco, but most in the Western States, Texas, and the Southern States.

The Yocona Mills, at Water Valley, Yalobusha County, on the Illinois Central Railroad, commenced operations in January, 1882, with a paid-up capital of $80,000, and with 3,300 spindles. Since that time the capital stock has been increased to $100,000, and the number of spindles increased to 5,000. Sixty hands are employed, mostly boys and girls. The boys and girls earn from 25 to 50 cents per day; the women are paid by the piece, and make from 50 to 80 cents per day; the men are paid from $1 to $2.50 per day. The machinery is all English make. The mills manufacture Nos. 20, 12½, and 10 cotton yarns, which are shipped to Philadelphia, Pa., and Columbus, Ga. The yarns are considered first-class in Philadelphia, and bring from one-half to three-fourths of a cent more per pound than Eastern yarns of the same grade. Of the hands employed, not more than three have ever been inside of a cotton factory before, having been raised in the surrounding

country, and were non-producers before these mills were started. The cotton consumed is bought from first hands, and carefully selected from the 11,000 bales shipped annually from Water Valley. Mr. Wagner, the secretary of the company, says that Eastern buyers prefer his yarns because better stock is used than in Eastern mills. These mills will be further enlarged soon.

The Stonewall Manufacturing Company, near Enterprise, Clarke County, has a substantial brick edifice, with two brick wings. The capital stock is $175,000; number of spindles, 6,000; number of looms, 180; number of hands employed, 180, all natives of this State; and number of bales of cotton consumed, 2,700. Aggregate wages paid per annum, $45,000. These mills manufacture 4–4 brown sheetings, 7–8 brown shirtings, drills, and osnaburgs.

The Natchez Cotton Mills occupy a large brick structure at Natchez, on the Mississippi River. It has 10,304 spindles, 304 looms, and 250 operatives, almost all Southern born, but not natives of the place.

The Rosalie Cotton Mills are also located at Natchez. They have 6,000 spindles, 160 looms, and employ about 150 operatives. Both of these mills manufacture brown cottons exclusively.

Neman's Woolen Mills, near Bay Saint Louis, on the coast, are in a prosperous condition, and manufacture beautiful cassimeres, flannels, plaids, tweeds, jeans, blankets, &c. A number of other mills might be mentioned to show the success of manufactures in Mississippi, but the above are deemed sufficient as examples to indicate what has been done, and what may yet be accomplished, in the development of the industrial interests of the State.

THE SILK INDUSTRY.

With the past two or three years considerable interest has been awakened in this State on the subject of sericulture. It is true that very little in a practical way has been accomplished, but there are many inquiries after a knowledge of its details, and a general and widespread belief exists that as a home industry for otherwise idle hands it can be made an important addition to individual and aggregate wealth. If carefully and intelligently undertaken and pursued there can be no doubt of this fact. As a business conducted for profit and on a large scale, it will hardly pay in this country, where labor is so much dearer than in the old silk-producing countries. There is, however, in this State a large class of non-producers, women and children and persons of feeble strength, who would hail with satisfaction some practicable method to enable them to add to the family income. Field work, even in its lighter forms, is unsuited to their condition and strength. There are few opportunities in other occupations, and consequently this large part of the population is subjected to an enforced idleness or the drudgery of routine domestic work. Silk culture opens to them a light, pleasing, interesting, and reasonably profitable occupation, by which,

with a few weeks' labor, in a moderate size family, a hundred dollars or more may be added to the family revenue. The food for silk-worms is near at hand, or can be produced at little expense. The Osage orange is widespread and quite plentiful, having been used extensively in this State for hedges, while the white mulberry (*Morus alba*) exists to a limited extent and is easily propagated and grown. A market for cocoons has been established at Corinth, Miss., and New Orleans, La., by the "Mississippi and Louisiana Silk Association."

There is, however, some danger of falling into the errors which made early attempts at silk culture, from 1834 to 1839, a failure. These attempts were spasmodic and speculative in their nature, and it is not surprising that in the end there was a total loss of all time and money devoted to them. Those who engaged honestly in the business were deceived by speculators and irresponsible dealers, or else became victims of their own want of system, intelligence, and perseverance. Silk culture should be undertaken only as a home industry by hands now idle, and then only after thorough preparation and careful study of its requirements.

Dr. P. T. Bailey, of Jackson, Miss., has been for several years experimenting with cocoon raising in a philanthropic way. Thoroughly convinced that it can be made profitable to the non-producing part of the population, he has annually raised a large number of eggs and worms and distributed them gratis to all interested in the subject. As a result a number of families will raise cocoons for market next season. Dr. Bailey finds no difficulty in keeping the eggs during the winter, simply by placing the cloth containing them in a drawer in his desk. The idea that the eggs have to be transported to a colder climate to prevent hatching is, therefore, erroneous. He further says there is very little trouble in raising cocoons, and evidently believes, with Dr. Lupi, that "in a well-directed cocoonery the silk-worm can die but from starvation."

Mr. L. S. Crozier, manager of the Mississippi and Louisiana Silk Company, Corinth, Miss., a pioneer in this industry, as well as one of its most successful promoters, furnishes the following facts as to the progress of silk culture in Mississippi:

In 1881, when I left Bayou Sara, La., for Corinth, Miss., I had only forty-two correspondents silk-growing in Mississippi. At this date I count nine hundred and seventy-six correspondents, all of whom have already made one or more experiments in silk culture. In spite of many failures, brought about by one reason or another, the success is general. From Bay Saint Louis, Natchez, Vicksburg, Meridian, Carrollton, West Point, Iuka, and Holly Springs I have received more than one hundred samples of cocoons, all first quality and worth the highest price in the market. The progress, though slow, is very sensible. The inferior breeds of silk-worms have been fewer in number, the good ones better cared for; and the result of these notable improvements has been the starting of several new silk-culture associations in the State—at Vicksburg, Natchez, Holly Springs, and other places.

At Jackson much has been done also, but a great part of the work has been performed under most unfavorable circumstances.

Let us give some details in explanation of the causes which produce failure, disappointment, and discouragement among many enthusiastic, but very ignorant, beginners:

A general belief exists among new silk culturists that silk-worms can be bred all the year, some making inquiries as to how we feed them in the winter time. Another more general error is that eggs can be procured at will, hatched at will, and cocoons can be raised any time from March to November. This is a great mistake. I have explained it many times, but will now take facts which happened in this State in 1883 to guide me in outlining a few of the conditions to success.

In the first place, it is very important for the grower to procure the eggs early and winter them at home. Then let them hatch as soon as the leaves are of the size of a quarter of a dollar, or even a nickel, because baby silk-spinners on such tender leaves do not eat them, and die flat if fed on too hard food at all the periods of their short life. Another reason for starting the breeding early in the spring is that the great heat of June and July in the North, and of May in the South, is most injurious to the larvæ, which are comparatively insensible to cold weather.

Very few of our silk-growers, starting with the conditions of success above mentioned, have failed completely; many of them have raised crops of cocoons averaging 160 lbs per ounce. Among these successful breeders, Miss Pollock and Mrs. Godfrey, of Corinth, deserve honorable mention, as also other ladies from many parts of the State who chanced to get good sound eggs, and started them early enough. But a great number of people decided to try silk-culture only when they had witnessed the success of their wise neighbors. They then wrote for eggs to raise in Mississippi, when Iowa and Nebraska were already entering the second period, or molt, of the spinners. Our eggs, forced into quite northern latitudes, where they were kept to prevent them from hatching and dying, and already late for even Northern States, were sent to South Mississippi, Texas, Louisiana, Alabama, &c. Out of one hundred ounces delivered in such condition, only ten or twelve have produced a few cocoons—not enough to pay for the trouble. All the rest have been a complete failure. This is the best answer one can give to those boasting about three successful crops in the year, starting one when the other is gathered. I will explain that I often raise three schools of spinners, but I start them all at only eight days interval from each other, so that the first hatched are spinning when the last ones are molting their first molt. And yet the best cocoons are the first hatched, the worst are the last.

A lady asks me, "Why do you send eggs in May since you say it is dangerous to ship them after January?" It is because, notwithstanding our strong recommendations and advice, people do not ask for eggs in due time, and, dangerous or not, we can ship them only when they are wanted, or throw them away, or give them for free distribution, if no demand comes before they hatch in spite of our efforts.

The last experiment has been made by myself with eggs preserved by Professor Barrnelli. They arrived here in July in apparent good condition. They belonged to a stout, hardy Japanese breed. I put them in branches upon the laths of shelves, without any paper interposed between to intercept the air. I left the doors and windows wide open day and night, except in stormy weather. Their food was selected from among the third and last side twigs grown, tender enough yet to be cut with the thumb nail. In spite of all these minute cares the jaundice and flatness began to decimate them from the first molt. After every meal hundreds of them were hanging under the shelves by their thin silk threads looking for air, avoiding feed. At the third molt I took the last ones in the nursery, where only three out of about 50,000 are yet living at this writing.

All these experiments have been made in all the silk countries of the world, and the fact is so well known at the silk exchanges in France, Italy, and Spain, as well as in Asiatic countries, that when the spring is backward the speculators increase their supplies and the price of silk often increases. Farmers and merchants are wont to say: "The silk worms will spin in the end of June or beginning of July. We will get

a very poor crop." And such has been the case this last spring in Europe and in China. The crop is much reduced and no increase in the prices of cocoons and silks has come yet to lessen that loss.

During the present year there have been established two small filatures at Corinth, and a larger one at New Orleans. This establishes two markets for cocoons in convenient reach of the silk-growers of this State, and is the best guarantee of success and encouragement we could expect.

The conclusion of this rapid sketch on sericulture in Mississippi is that any one who will go on wisely, without illusions and prejudice, can surely make silk culture a very important addition to the general income, and will give a strong impulse to the new-born silk reeling and filature, which cannot succeed unless supplied with first-class cocoons.

We have said that the good breeds have increased, while the poorer have decreased, but there are yet too many of the latter class; the good ones are too scarce, since thousands of pounds have been ordered from Europe in order to allow the first filature in the United States to work all the year around. The State of Mississippi could alone provide cocoons sufficient for such filatures in every one of her counties.

JUTE CULTURE.

The introduction of a new and staple product, second only to that of cotton in value and importance, into the agriculture of Mississippi, is now confidently anticipated, and appears to be a question of a very few years. A number of intelligent planters, fully impressed with the folly of being dependent upon a single money crop, and anxiously seeking the best means for diversifying the agricultural industries of the State, have carried forward experiments the present season with a fiber, new to the agriculture of this country, which gives promise of results of the highest practicable importance.

The public attention, first directed to the production of jute by the Department of Agriculture, has grown and increased, and the experiments which have followed have in every instance confirmed the opinion that its growth as a staple product may be made to assume a national importance. The characteristics of the soil and climate of the Gulf States created a natural presumption that they could grow jute as successfully as India, and that its production is practicable and may be made profitable seems now to no longer admit of a doubt. All agree that jute can be successfully grown in the cotton country. It can not only be grown, but grown in large quantities and very cheaply. On this point opinion is united, and there is no ground for further argument or experiment.

As has been often stated, the only remaining question which admits of a single doubt, and about which opinion is divided, arises after the plant is grown. It is now simply a question of labor necessary to separate the fiber from the stalk and put it into merchantable condition. This is accomplished in India, after steeping in water for about fifteen days, by hand, but all agree that this method of obtaining the fiber is

not practicable here. Our labor cannot complete with the low-priced labor of India, where 10 and 15 cents constitute fair wages for a day's labor. For the preparation of the fiber for market, the producers of jute in this country are therefore dependent upon labor-saving machinery to perform this work in an easy, cheap, and expeditious manner. Upon the practicability of accomplishing this work by machinery cheaply and in large quantities rests the entire problem of successful jute production in the United States. It has been doubted by some whether such machinery could be invented to do the work without injury to the fiber, but many have felt hopeful that American inventive skill would be equal to this demand.

The results of practical tests in Mississippi the present season seem to indicate that the problem, if not already solved, is now so near solution as to make success reasonably certain.

Mr. C. Menelas, a very intelligent gentleman, who is familiar with jute production in India, from a long residence there, and who has been largely instrumental in directing public attention to the subject in this country by numerous experiments at his plantation near Brookhaven, Miss., makes the following interesting statements in his testimony before the Tariff Commission:

In 1878 I bought a plantation in Mississippi, and concluded to make an experiment in jute culture. I wrote to the Agricultural Department at Washington about it, and planted one-eighth of an acre. The land upon which I planted was alluvial, such as is used for corn and cotton. To my surprise, I saw that crop grow magnificently to perfection. I took some stalks to the Cotton Exchange, in New Orleans, which measured 15 feet high. I induced the commissioner of agriculture of Louisiana and other friends of mine to plant several acres, and I have been through their plantations, and it seems to grow admirably. So there is not the slightest doubt that jute will grow splendidly.

Question. You are the pioneer cultivator of jute in the United States, are you not?—Answer. Jute was raised in this country fifteen or twenty years ago, while I was in India, where I spent ten years. It was not cultivated successfully the first year, and after that it was abandoned. We hope for better results this time.

Q. During the ten years you were in India, I presume you saw a great deal of jute cultivation?—A. Yes; I handled a great deal of jute.

Q. And you think that which you raised in Mississippi was equal to any you ever saw in India?—A. Most undoubtedly; and I do not hesitate to say that in a few years we shall produce here, with intelligent labor, much better jute than India produces.

Q. The labor required to produce jute as a cultivated plant is very small, I understand?—A. Extremely small—smaller than any of the usual crops. The first labor is to plant; there is very little to do after that.

Q. Preparing the jute for market requires labor, but you think that will be supplanted to a great extent by the machines to which you have referred?—A. I have not the slightest doubt of it. The cotton-gin was the offspring of necessity, and some machinery for this purpose will surely be invented. The genius of our countrymen will come to the rescue as soon as they see the need of machinery.

There seems to be no limit to the demand for jute products, which is constantly increasing, and there need be no fears that there will not be a ready sale for all this country will produce, even with extensive cultivation for many years to come. Jute is manufactured into cordage,

twine, carpets, curtains, and cloths, and various kinds of grain and coffee bags and gunnies. Jute butts are used to manufacture paper, cotton bagging, and domestic gunny cloth.

In this connection an extract from the report on jute culture, published by the Department of Agriculture and prepared by Professor Waterhouse, of Saint Louis, is worthy of a place here, since information on this important subject is eagerly sought after by many inquiring minds:

Jute is mixed with cotton, linen, and silk. It is a material part of twilled stair-carpeting and low-priced broadcloth. In combination with other textiles, it imitates the gloss of Irish linen, the luster of French silk, the beauty of Turkish rugs, and the splendor of Axminster, Kidderminster, Brussels, and Venetian carpets. Single or mixed, it enters into the manufacture of a thousand articles of commerce. In 1872, there were in Dundee about one hundred jute-mills, employing upward of 20,000 workmen, and manufacturing more than 180,000,000 pounds of jute annually. In the same year nearly 50,000,000 gunny bags—most of which were made in Dundee—were exported from Great Britain. Of the 300,000,000 pounds of jute that were manufactured in the United Kingdom in 1876, 200,000,000 pounds were woven in the mills of Dundee. The annual value of the flax, hemp, and jute manufactured in Dundee is now $15,000,000. The jute factories of Dundee have created a flourishing city, given employment to thousands of workmen, diffused prosperity throughout a large community, promoted the commerce of Scotland in the importation of the raw material and the exportation of the manufactured product, and facilitated the movement of the cotton and grain crops of the world.

What has been so successfully accomplished in Dundee can be done with a still grander success in the United States.

We not only can spin and weave the fiber, but we can also raise it.

We not only can derive the profits of making the fabrics, but we can also enrich ourselves by the two-fold economies of the growth and manufacture of the staple.

There are also important incidental advantages of this tillage. The vigorous, luxuriant growth of the jute almost exterminates weeds from the soil in which it is sown, while the bitterness of its juice repels the attacks of insects. It has been found that cotton-fields surrounded by a belt of jute were exempt from the depredations of the caterpillar, while unprotected fields in the same neighborhood suffered from its ravages.

It will probably take another season to demonstrate fully the success of the several machines for decorticating the fiber. A marked success appears to have attended the trials of several machines in Mississippi the present year, but it is not wise to advance a new and insufficiently-tried product too rapidly, and another season will no doubt demonstrate beyond question the success of jute-culture in the State.

It was sixty-five years or more after the cultivation of cotton was first suggested before it was successfully introduced. In this age of progress and invention it will only take a very few years to successfully demonstrate that jute, a fiber which ranks next to cotton in uses and value, can be profitably grown beside the cotton-fields.

On the 1st of October a visit was made to the Menelas plantation, near Brookhaven, Miss. Although there had been one of the longest and most protracted droughts known for years, the jute-field presented

a green and beautiful appearance. It was, indeed, about the only green vegetation to be seen. Mr. Menelas planted for experiments about 25 acres of jute this year, in rows 3 feet apart, applying the culture generally given to corn. The jute was planted on alluvial bottom land, and was from 8 to 12 feet in height. It would have been much better, of course, but for the long-protracted drought, which, however, it stood remarkably well. All experiments and experience show that the weed is absolutely free from the ravages of insects, and, being bitter, is not troubled by stock of any kind.

It is too early yet to make an accurate statement of the cost of jute production and its profits. This can only be done when experience shows the cost of making the crop, decorticating and washing the fiber, and when actual sales to jute purchasers have been made. An estimate prepared at the Menelas plantation gives the cost of plowing, planting, and cultivating an acre at $13; the cost of cutting the stalks, hauling, decorticating, washing, and baling the fiber, on an estimated yield of 15 tons of green stalks to the acre, at $30, making a total cost of $43. Then the yield, one ton of fiber, 2,000 pounds, at 4 cents per pound, gives the gross receipts as $80 per acre, and the net profit at $37 per acre. This estimate is based on jute planted in rows 3 feet apart. It probably overestimates the cost of making jute and preparing the fiber than otherwise.

Mr. Albert Angell, of New Jersey, an inventor of a jute-decorticating machine, remained upon the plantation about three months this summer, making experiments and perfecting his machine. It was seen by the writer at this visit, but not in operation, as the season was so far advanced that the jute had seeded, and passed the proper condition for decorticating. The machine is simple, easily operated, and, from all accounts, does the work perfectly. Samples of the fiber produced by this machine were sent to manufacturers in New York, and pronounced equal to the India jute, and worth the highest price in the market. It also has the merit of being cheap. Mr. Angell authorizes the statement that they can be sold for $350 each, including the machine for washing the fiber, which is regarded as an important addition.

As the question of machines is one of vital importance to the industry, Mr. Angell's own statement as to his machine is of interest:

I brought from New Jersey with me two decorticators, one for jute and one for ramie. These machines removed the pith and scraped off the bark and leaves to perfection, and to all appearances were perfect. The ribbons of jute were then put into the water, and when washed out the fiber was not up to the quality of India jute. I then looked for the cause, and by experimenting with some jute stripped from the stalk by hand, without being scraped, and some scraped, and both the scraped and unscraped ribbons put into the water side by side, in two separate bunches, and allowed to go through the retting process and then washed: it was plainly seen that the unscraped bunch of fiber was whiter and more glossy, and better retted: that is, there was no gum left on it. This plainly showed me that I was injuring the fiber by scraping off the bark. I then immediately had the decorticator reconstructed to produce unscraped ribbons, and without the slightest injury to the outer bark. When

the machine was finished and set to work the result was just as I desired. I then decorticated a quality of jute and put it into the water, and in ten days it was retted. I had several negroes at the creek washing out the fiber; noticed the process of washing, and saw that it would never pay to wash jute by hand. I at once constructed a washing-machine, decorticated more jute, and by the time it was retted the washing-machine was ready. I then took three men, one to turn the machine, one to draw out the bunches of fiber from the water and feed them to the machine, and one to receive the washed bunches of fiber and throw them over a line. I noticed that the fiber when passed through the machine was better washed, was kept straighter than when washed by hand, and, besides, the three men could easily pass through the machine more bunches than twenty could wash without it. This solved the problem. Here was where the cheap labor of India came in, and here it was that we needed machines to take the place of the cheap labor. The fiber from unscraped ribbons and washed by the washing-machine proved better than anything I had ever produced in the five years of my experience.

Samples of this fiber were sent to New York manufacturers, and they declared it first quality, worth 4¾ cents per pound. One Dundee manufacturer pronounced it superior to the average India jute. I was always somewhat skeptical myself about the possibilities of producing jute cheap enough to make it pay, but now I have overcome these difficulties that were always staring me in the face. I am convinced that we can do it cheaper than India. My machine for washing the fiber by power can do in one day, with three hands, what it would take 160 men of India to do, allowing each man 100 pounds of fiber per day, and this is more than any of the negroes on Mr. Menelas' plantation can do. A washing-machine by one or two mules' power can wash out from 6 to 8 tons of fiber per day, better and more uniformly than could be done by hand. A hand washing-machine can wash one ton of fiber per day, when it is only necessary to take up the bunches of fiber and feed them to the machine. Of course the Indian would have to strip and wash, while we only feed the machines, the stripping having been previously done by the decorticator.

Thus it will be seen that the problem of producing cheap jute fiber in America, and of a superior quality, is solved. I have accomplished at the Menelas plantation this season more than I have done in five years before, and what I never could have done by remaining in New Jersey. I should have gone to a jute plantation five years ago and made my experiment, and by this time America would be exporting jute, but it is not too late. In the next five years I hope to see my predictions verified.

The Delta Jute and Fiber Company, of Washington County, was organized and incorporated as a result of the Jute Convention held in Jackson last January. This company is composed of some of the best planters of that section, and the rich alluvial soil of the Delta is considered especially favorable to produce the highest results in the growth of the product. The results, therefore, of the experiments of these gentlemen have been looked for with much public interest. This company has become the proprietors in the United States of the machine invented by Mr. T. Albee Smith, and a statement from the president of the company, Hon. W. W. Stone, as to the method of culture and the results obtained by this machine, is worthy of mention here. A copy of the report furnished the Department of Agriculture contains the following:

As will be remembered by many, in the South particularly, during the autumn of 1882, a decided interest in jute culture was exerted by reports through the press and considerable correspondence between Professor Waterhouse and others relative to the results of the experimental tests of a machine invented by Mr. T. Albee Smith, which was then in operation in Mississippi.

The almost entire failure of the cotton crop throughout the Mississippi delta region prepared the mind of the average planter to look with favor upon any departure from old methods that gave promise of fair profits with diminished risk. Hence the universal interest felt and the inquries made relative to jute as a partial substitute for cotton at least. Of jute, the method of seeding, habits of growth, mode of preparation for market and the loom, and of the thousand uses to which it is devoted, nothing, absolutely nothing, was known to the planters of the South, as only a few in Louisiana and Mississippi had even grown it in a limited way. So great was the interest manifested that Maj. E. G. Wall, commissioner of agriculture of Mississippi, published a call for a "Jute Convention," which convened in Jackson in January last.

During the session of the convention it was ascertained that jute would grow in the Southern States as vigorously as in India; that the fiber was fully equal to the Indian article; and the sole obstacle to be overcome was the separation of fiber from pith cheaply enough to compete with Indian labor. This could not be done after their method with labor at our prices; hence the use of machinery was a necessity. To invent machinery adapted to this end much time and large amounts of money had been expended. Many machines had been tried with signal failure.

The presence of Mr. Smith at the convention and the number of evidences at hand of the successful performance of his machine in decorticating jute stalks induced the formation, by a number of planters of Washington County, of the Delta Jute and Fiber Company, which became the proprietor of the Smith machine.

The company at once took steps to procure seed from India sufficient to make a thorough test in a limited way of jute growing, from seeding to baling the prepared fiber. No member of the company having had experience in planting jute, of course we had to be governed by the experience and advice of those who seemed to be best advised on the subject.

Accordingly, on the 7th of April last we made our first planting, sowing broadcast 9 pounds per acre, on ground thoroughly prepared, as if for turnips. Planted again on the 2d of May under favorable conditions, except that the ground was exceedingly cool, preventing the prompt germination of all seeds planted at the time. Both of these plantings failed of a stand, and on the 23d of May reseeded (broadcast) 13 pounds per acre, which amount was used throughout the crop. Continued planting, with intervals, up to the 1st of July. After the soil had become warmed and warm nights succeeded, we had no difficulty in securing admirable stands. The season was propitious for all vegetation during June and July, and we had good hope of an abundant harvest. But the habit of jute growth is very slow until it attains a height of 15 to 18 inches, after which it is very rapid. Our entire plant was on ground that had been overflowed in 1882. Some of it had not been cultivated at all, and produced a rank growth of vegetation, thoroughly seeding the ground with weeds. The remainder had been but poorly cultivated and was nearly as foul. In consequence of this condition, simultaneously with the jute sprang every variety of weed known in the calendar, greatly interfering with the maturity and full, large growth of stalks necessary to make that yield of fiber per acre which under favorable conditions we may feel assured of.

That portion of the crop planted in drills for seed and cultivated just sufficiently to keep down vegetation in its early stage of growth has done most admirably, attaining a height of 12 feet in one hundred days. From our experience we can make deductions touching the growing of jute by which we shall govern ourselves in future, and with confidence submit them to others who may embark in jute culture for guidance. The ground should be carefully prepared, as for all small grain. Planting should not be made until the soil is warm. Seeding broadcast is not reliable except where it follows thorough tillage, and the seeds of all other ranker and more rapidly growing vegetation have been destroyed. To insure a successful crop it should be drilled, and in rows sufficiently wide (say 20 to 24 inches) to admit the use

of cultivators or any implement that will keep it clean until it reaches the height of 2 feet. It will bear a very thick stand in the drill.

During the summer the company had built, under Mr. Smith's supervision, a machine of greater and improved capacity than the one used by him in his experimental tests in 1882. Of the peculiar mechanism of this machine or its method of operation we presume it is hardly necessary to say much just here, since various accounts giving particulars and details were written and published at great length throughout the country a year ago. After the stalks have been decorticated and the retting process gone through with, to assist in washing the fiber thoroughly and more rapidly than heretofore, Mr. Smith has invented a fiber washing and hackling machine, a very ingenious, simple, and efficient device for washing the bands of fiber quickly, and in the same operation cutting out the butts, thereby leaving the butt end in a much more desirable condition for the lap or splice than is the case with the imported jute, from which the butts have been cut off with a knife, leaving them with a square end. The hackle takes the place of the English *snipping machine*, introduced into India a few years ago for the purpose of combing out the butts of a certain class of jute, thereby avoiding the square end. The machine is cheap. A hand-machine will wash and hackle 1,000 pounds per day. A power-machine can be built to any capacity up to 10 tons per day. We have been operating the decorticator since 10th of September. Many practical men have seen and noted with care its work upon stalks green from the field, which had been cut for ten days, partially dried, and all bear witness to its efficiency and to its capacity to do what the company and inventor hoped for, viz., to so completely separate the wood and fiber of green jute just cut, with so little laborious and expensive handling, and in such quantities per day, preparing the fiber for retting, as to give assurance that from this date jute can be classed among the agricultural crops of the South.

As an evidence of the company's conviction of profitable jute culture and manipulation through the agency of the Smith machine, they propose to plant 500 acres next year. The company proposes to arrange at once for the building of machines, not only for its own use, but for such parties as may wish to embark in jute growing in this and other States. Moreover, they anticipate working up in factories of their own, established near the fields, the jute grown in them.

In addition to the foregoing, a machine has been invented by Mr. Frank Luft, of New Orleans. It was not operated in Mississippi, but from tests made in New Orleans with jute raised at the Menelas plantation it is claimed that it does the work successfully and gives complete satisfaction.

CONDITION OF FARMS AND FARM-HOUSES.

The number of dwellings in Mississippi in 1880 was 208,297; the average number of persons to a dwelling was 5.43; the number of families was 215,055; the number of persons to a family was 5.26. It will be seen that, lacking about 7,000, there was a dwelling to each family.

In early times, when the country was first settled, the farm dwellings were, as a matter of course, rude and lacking in the conveniences and comforts of modern farm dwellings. These cheap and temporary structures were generally located near springs of water, which abound in the State, and were constructed of logs, either hewn or rough, taken from the adjacent forests.

As the population increased better buildings were erected of lumber in districts convenient to the mills, and these in time gave way in many instances to substantial and handsome residences. Prior to the war

many buildings of the latter class were constructed by well-to-do planters, and the country mansions of this class were noted for their beauty and attractiveness. With an increasing wealth came an increasing taste for the beautiful, and the tall white mansions, surrounded by well-kept grounds, and generally located on the public highways, commanding a view of the distance, became quite common in the richer portions of the State. The owners of these dwellings, reduced in means after the war, allowed them to suffer for repairs, which rapidly hastened their decay. They may be seen now in all parts of the State, old-time costly residences, presenting a weather-beaten and generally neglected appearance. As an offset to this neglect, however, many new and beautiful farm residences have been constructed to take the place of old ones, or where estates have been divided, which, while not as costly as the old-style mansion, are more convenient and present altogether a fresher and more tasteful appearance.

More attention is also being paid to the adornment of rural homes, clearly indicating that the taste for the beautiful and attractive is largely on the increase in the State. Even among the poorest classes this commendable spirit is noticeable in attempts, sometimes rude it is true, but which are worthy of all encouragement, to make homes and grounds attractive. It is seen in the few flowers planted on the grounds, and in the trailing vines upon the cottages. This growing sentiment to beautify among the rural classes is one of the healthy and cheering signs of the times. It points to increased contentment and culture, and consequently increased happiness. It is to be hoped that some cheap plan for the adornment of rural homes will be devised and generally adopted, for it is a practicable subject, well worthy of earnest consideration.

There is also a tendency to improve other farm buildings and the general appearance and condition of farms. Barns, stables, and other out-buildings are now being constructed with a view to architectural appearance as well as to convenience and permanence. Ditches are annually cleaned out, made straight, and kept free from useless vegetation. The wire fences are coming into general use in many portions of the State, and while cheaper and more lasting than the ordinary rail fence, they are also more attractive, and give an air of thrift and prosperity to the farms which they inclose.

The improved methods of agriculture and the reduction in the size of farms have done much to give an appearance of neatness and order, which were often lacking under the old method of cultivating extensive estates.

HOMESTEAD AND OTHER EXEMPTIONS.

The following is the exemption law of Mississippi:

There is exempt from seizure and sale, under execution or attachment, in favor of each head of a family, or housekeeper in this State, the following property, to wit: Two work-horses or mules, or one yoke of oxen, two cows and calves, five head of

stock hogs, and five sheep, one hundred and fifty bushels of corn, ten bushels of wheat or rice, two hundred pounds of pork or bacon or other meat, one cart or wagon not to exceed one hundred dollars in value, household and kitchen furniture, to be selected by the debtor, not to exceed one hundred dollars in value, three hundred bundles of fodder, one sewing machine, and all colts under three years old, raised in this State by the debtor; and the wages of every laborer or mechanic, to the amount of one hundred dollars. The following property is likewise exempt, in the hands of the persons named, viz: The tools of a mechanic, necessary in carrying on his trade; the agricultural implements of a farmer, necessary for two male laborers; the implements of a laborer, necessary in his usual employment; the books of a student, required for the completion of his education; the wearing apparel of every person; the libraries of licensed attorneys at law, practicing physicians, and ministers of the gospel, not exceeding two hundred and fifty dollars in value; also the instruments of surgeons and dentists, used in their profession, not exceeding two hundred and fifty dollars in value; the arms and accouterments of each person of the militia of the State; and all globes, books, and maps, used by teachers of schools, academies, and colleges. That every citizen of this State, male or female, being a householder and having a family, shall be entitled to hold exempt from seizure or sale, under execution or attachment, the land and buildings owned and occupied as a residence by such debtor; provided, the quantity of land shall not exceed one hundred and sixty acres, nor the value thereof, inclusive of improvements, the sum of two thousand dollars.

FRUIT AND VEGETABLE PRODUCTION.

As indicating the growth of diversified industries in the State, it may be mentioned that a very profitable and handsome business has been built up in places adjacent to the railroad lines in the production and shipment of fruits and vegetables to the larger cities. This new industry has been steadily growing for a number of years, until it now assumes proportions reaching into the thousands at a number of points in Central and Southern Mississippi along the line of the Illinois Central Railroad. The acreage in fruits and vegetables is constantly being increased, and the industry, inaugurated by a few progressive minds, bids fair to spread and widen until it embraces all points accessible to markets, thereby becoming an important factor in the State's productions. The success which has attended the efforts of those who have engaged in the business shows what may be accomplished when it increases sufficiently to obtain concessions from railroads in the matter of rates, rapid transportation, and improved methods of handling. New markets will be opened up, a healthy rivalry will be established to produce the best results, and there will be a mutuality of interests prompting organization and co-operation in all things tending to promote and advance the industry. A direct result, and one already foreshadowed in the State, of the growth of the business and increased production will be the establishment of canneries to utilize such stock as may be on hand at seasons when the markets are depressed to such an extent that it is no longer profitable to make shipments. This sometimes happens late in the season.

In the central and southern portions of the State fruit and vegetable production as a business has been found so profitable as to obtain a

firm footing within the past few years. This part of the State possesses many advantages for successful fruit and vegetable growing, and is attracting the attention of market gardeners of the North and West. The winters are mild and short, and successive crops of a large variety of vegetables can be raised during the year with outdoor culture. It is claimed that in the extreme southern portions of the State, with reasonable attention, green pease, lettuce, radishes, and a number of other vegetables can be raised every month in the year. The varieties of fruit which grow here successfully include species grown in more northern latitudes, as well as those which nearly approach the tropics.

The soil in South Mississippi is a sandy loam, while higher up it contains a great deal of lime, conditions considered favorable to profitable fruit and vegetable growing. The fig-tree and the vine bring the most satisfactory results, with but slight attention. In the southern part of the State the fig, which bears regularly every year, matures its first crop in May and the second and more abundant crop in June and July. It is of long life, and neither tree nor fruit is subject to disease. The dry season, which usually occurs about the time of the maturity of the fig, renders the preserving and drying of it a labor of easy accomplishment. Peaches, pears, and apples do well, but difficulty has been experienced in obtaining a variety of the latter which will keep well during the winter. Oranges are quite extensively and successfully grown on the coast, and are considered equal in flavor to the Florida oranges. The Scuppernong grape is also largely grown on the coast, and to a less extent throughout the State. From it excellent wines are manufactured. The Concord, Catawba, and Martha grapes have found most favor. The vines are usually planted in February, and most of the varieties mature in June and July. Blackberries and dewberries are indigenous throughout the State, and grow luxuriantly in fields and woodlands. On fertile lands these fruits compare favorably, both in size and flavor, with the cultivated berries, and are no doubt susceptible of great improvement by cultivation.

Strawberries have attracted the most attention and are considered the safest and most profitable crop. Plants put out in June yield a full crop the following spring, when kept clear of grass and weeds and well cultivated in the fall. The Wilson, Albany, Imperial, and Monarch of the West are the most approved varieties. They are easily cultivated, and boys and girls are generally employed to gather the crop. The first shipments from this State are usually made about the 15th of March in each year to Chicago, Ill. There are more than three hundred acres in strawberries near Madison Station, Madison County. Dr. Hayden McKay has 130 acres, and Dr. John McKay 100 acres in strawberries. These progressive gentlemen have been making experiments with the Tiffany refrigerator car, which, if successful, will very largely reduce the cost of transportation as now made through the express company.

The following represents the shipments through the express company from Madison Station for 1882 and 1883:

Weight, &c., of shipments.	1882.	1883.
	Pounds.	*Pounds.*
Aggregate weight, strawberries, shipped	94,292	98,392
Estimated number of crates (24 quarts each)	2,828	2,951
Aggregate weight of other fruits and vegetables	66,264	38,715

The shipments, exclusive of strawberries, consisted of peaches, Chickasaw plums, raspberries, and vegetables. Terry, a small village south of Jackson, made the following shipments for 1882 and 1883:

Fruits and vegetables.		1882.	1883.
Peaches	boxes of one-third bushel	30,000	13,000
Plums	do	1,500	1,000
Apples	do	1,200	1,000
Beans and pease	do	400	500

Crystal Springs, Copiah County, makes a larger shipment of fruits and vegetables than any other point in the State. Here the cotton fields have given way to fruit and vegetable farms, and those who have engaged in the new industry have done so with an energy and intelligence that have produced the highest results. Mr. S. H. Stackhouse, who has been largely instrumental in promoting the industry, says that the most profitable products are strawberries, cantaloupes, and tomatoes. That the average yield of strawberries, tomatoes, and melons the present year was from $200 to $250 per acre. Last year the yield of melons and tomatoes per acre was much larger. Results depend a great deal on seasons, markets, and cultivation. The shipments are made almost exclusively by express. The express charges on vegetables to Chicago are $2.25 per 100 pounds, and by freight $1.10 per 100 pounds.

Mr. Stackhouse furnishes the following statement of the shipments from Crystal Springs the present season:

Radishes	boxes	225
Asparagus	do	11
Onions	bushel boxes	473
Potatoes	barrels	691
Beets	bushels	455
Beans	do	4,429
Pease	do	1,820
Strawberries	crates	1,000
Plums	bushels	2,185
Peaches	boxes, one-third bushel	33,000
Tomatoes	do	28,223
Melons	bushel crates	920

Making over 70,000 packages, equal in value to about $160,000, or 4,000 bales of cotton at $40 per bale.

In addition to the above, shipments are made from Canton, Hazlehurst, Brookhaven, and other points along the line of the Illinois Cen-

tral Railroad, and from points along the Vicksburg and Meridian, and Mobile and Ohio Railroads.

The State is also rich in wild fruits, as will appear by the following list:

APPLE (*Pyrus*).—*Pyrus coronaria*—crab apple; *P. angustifolia*—crab apple, good for preserves and apple sauce.

BLACKBERRY.—*Rubus villosus*—high blackberry; *R. cuneifolicis*—sand blackberry.

CURRANT.—*Ribes floridum*—wild black currant; *R. tenuifolium*—wild gooseberry.

DEWBERRY.—*R. canadensis*—northern dewberry; *R. trivialis*—southern dewberry.

DEERBERRY.—*Vaccinium corymboseum*—swamp blueberry; *V. arboreum*—fackleberry.

ELDER.—*Sambucus canadensis.* Berries make a good wine.

GRAPE.—(*Vitis*)—*Vitis bipinnata; V. incisa; V. indivisa; V. labrusca*—Northern fox grape; *V. æstivalis*—summer grape; *V. cordifolia*—frost grape; *V. vulpina*—muscadine.

HUCKLEBERRY.—*Gaylussacia resinosa*—black huckleberry; *G. frondosa*—blue dangler—high blueberry; *G. domosa.*

MULBERRY (*Morus*).—*Morus rubra.* Fruit deep red, much like a blackberry in appearance—juicy and sweet.

PAPAW.—(*Asimina triloba*). Fruit very sweet and edible, and much improved by cultivation; grows in well-shaded alluvial lands; fibrous bark valuable.

PERSIMMON (*Diospyrus*).—*Diospyrus virginiana.* Fruit palatable after frost, and it is believed would be greatly improved by cultivation and made to rival the celebrated *Diospyrus Kaki*, or Japan persimmon.

PLUM (*Prunus*).—*Prunus americana*—wild plum; *P. chicasa*—Chickasaw plum; *P. pumila*—dwarf cherry; *P. serotina*—wild black cherry.

SLOE.—*Viburnum prunifolium*—black haw.

MISSISSIPPI AS A GRASS AND STOCK COUNTRY.

These subjects are so nearly related that they are best considered together. There can be no successful and profitable industry in stock raising unless there is ample pasturage the greater part of the year.

Good pasturage, an abundance of water, short, mild winters, and accessible markets, are the advantages Mississippi possesses for stock raising.

The farmers of the State have long waged an energetic warfare against grass, which they considered their most troublesome foe; they are now beginning to look upon this growth as their strongest ally, and with a new and proper appreciation of the immense value of this crop to the agricultural interests of the State. The warfare against "General Green," to use a popular plantation expression, of course necessarily continues in the cultivation of crops, but many are finding by experi-

ence that the profits on grass and stock often exceed those on the crops, and the disposition to engage in this new departure as a matter of business has increased greatly in the past few years in all sections of the State.

The question of ascertaining the grasses best suited to the soil and climate of the State has been made the object of many experiments, much thought, and attention by the most progressive farmers and stock breeders of the State.

Of late years, since the exclusive culture of cotton has by repeated disastrous experiments proven unwise and unprofitable, the interest in grass and stock has assumed great importance. Probably no other subject has for years enlisted the attention of intelligent farmers and landholders so generally; and this awakening interest is destined to grow and widen until Mississippi takes its proper place among the grass and stock producing States. It is a subject of vital importance, no less on account of its effect in the amelioration and restoration of exhausted lands than the certain and direct profits to be obtained therefrom.

The grasses of the State which are commonly referred to as natural, and pasture grasses, which grow spontaneously, with little or no care and attention, constitute a never-failing and exhaustless mine of wealth, which, when properly worked, will afford a new and valuable source of revenue. Of this class the well-known Bermuda (*Cynodon dactylon*) is considered the most valuable and is entitled to the first place, but its precedence is being energetically contested by a comparatively new and powerful rival, the Japan clover, or *Lespedeza striata*. The Bermuda, while an introduced grass, like the Japan clover, is now so well established that it may be very properly considered as a native.

In a valuable little work on grasses, Dr. D. L. Phares, of the Mississippi Agricultural and Mechanical College, says of Bermuda:

As a permanent pasture grass I know of no other that I consider so valuable as this, after having transplanted it from near the mouth of Red River to my present residence thirty-five years ago, and having studied it on hundreds of other farms, commons, and levees for a longer period. As hay this grass has been cured and held in high esteem by many farmers in Mississippi for more than forty years. The late Mr. Thomas Affleck, of Texas, but for many years a well-known planter in Mississippi, with characteristic Scotch thrift, promptly recognized the value of this grass, largely profited by it, and, as long as he lived, by mouth and pen inculcated its great worth for pasture and hay, himself making five tons of the latter to the acre. Dr. Ravenel, by the aid of nitrate of soda, obtained at the rate of ten tons to the acre on a lot near Charleston, S. C. Many other examples could be given as to the quantity of hay cut from this grass, and innumerable testimonials as to its nutritive value. On good soil it covers the ground densely several inches deep with its prostrate stems and dense leafage, which are always moist, even in dry weather.

This grass is a rapid and valuable fertilizer, and is of great value in holding earthworks and levees of sand and loose soil against floods of water, and in preventing lands from washing. It can be successfully propagated only by transplanting the roots and stems, but when once started spreads rapidly. It thrives best when stock keep it well trodden, and should be mowed from three to four times every summer for hay.

Mr. William M. Robertson, of Claiborne County, writes of Bermuda:

I cut 60 acres of Bermuda grass and sold therefrom the surplus hay, amounting (as shown by my books) to 275 tons of fine hay, and left the best cutting of the season uncut on the meadow. It was given up by all who saw the hay to be the best they ever saw. I had from 25 to 30 head of stock on the meadow all the time I was mowing; they did not appear to hurt it at all. Bermuda grass is the best grazing for stock in my experience with grass, and horses and mules supplied with it need but little corn to do good work.

The Japan clover (*Lespedeza striata*) exists almost everywhere throughout the State, in shade or sunshine, on poor lands and rich, in red clay and sandy gullies, and on soil that will not produce anything else. It spreads with marvelous rapidity, exterminating in its course even broom sedge and Bermuda grass. How and whence it came are questions that have not yet been satisfactorily explained. It is supposed to have come from Japan, but in what manner it got a start in the Southern country is not known. It was first noticed in Hinds County about 1878, but several years earlier in other portions of the State, and it may be said that for the last fifteen years it has been rapidly spreading in various sections. It grows well in shade, seems not to be affected by either excessive rain or drought; indeed, it appears to grow regardless of the seasons. It affords fine grazing; as a hay for winter feed many farmers consider it incomparable, while it promises to be an important factor in the restoration of exhausted lands, arresting washes and fertilizing the soil, comparing in this latter respect, it is said, very favorably with red clover. An intelligent stock-raiser states that he has no trouble in curing the hay, and that in winter stock will leave all other food for it.

Dr. Phares says of *Lespedeza:*

Stock do not relish this plant at first sight, but tasting a few times, they become very fond of it for grazing and hay. In many places they abandon all the natural pasturage in March, April, or May, and confine themselves to this till frost kills it down. By frequent grazing or mowing it is kept in a growing, tender, palatable condition. Cattle fatten on it and produce superior milk, butter, and beef. And this is just what should be expected when we consider that the justly esteemed red clover contains 16 per cent. of albuminoids and 41 per cent. of carbohydrates, while *Lespedeza* contains nearly as much albuminoids and 56.79 per cent. of carbohydrates.

The grass popularly called "broom sedge" (*Andropogon*), when burned off produces in the spring a new crop of tender, nutritious herbage, which stock eat with much relish. It is not long tender when not well grazed, and then affords only a brief pasturage. When cut before it becomes tough it makes a very fine hay.

A very and justly popular grass for summer and fall grazing, and one of the most widely diffused, is the well-known crab grass (*Panicum sanguinale*). It has been considered one of the worst enemies of the cotton-planter, but is a great boon to grass and stock raisers. Dr. Phares says he has seen a crop (many of them) of this grass harvested worth more than the corn that could be produced on the same ground, and corn and cotton fields of a wet season so overrun with this grass that in May, June, July, or August, ten days' work with mowers and horse-

rakes would secure in choice hay two to ten fold more value than many months' labor with teams and machinery and heavy expenses could obtain from the cotton and corn. This grass makes an excellent hay, of which live stock are very fond, preferring it to the best Northern hay. Crab grass is excellent for summer pasturage also, and with many bad managers it comes as a godsend to eke out a short corn supply for work animals, saving their lives from May to August, and thus saving the growing crop.

The above are the more important of what are termed native pasture grasses. There are a great many other kinds, some quite valuable, but a detailed catalogue of them cannot be attempted here. Dr. Charles Mohr, of Mobile, states that he has himself collected in South and Middle Alabama one hundred and thirty-two species, belonging to fifty-three genera of native grasses. No doubt the list in Mississippi would be quite as large. Many of the native grasses produce astonishing results from cultivation.

Almost all of the cultivated grasses and clovers have done well in Mississippi with proper care and attention. There have been failures in some instances, it is true, but they have generally resulted from careless and improper preparation of the soil at planting. The following article on the feed-stuffs of Mississippi, prepared for this report by Prof. John A. Myers, State chemist, and professor of chemistry in the Agricultural and Mechanical College, is full of interest:

Although during the late civil war Mississippi swarmed with stock (cattle and hogs), and was one of the chief granaries from which some of the armies drew their supplies, it is not unfrequently stated that Mississippi is unsuited for the growing of stock. It is very strange that within twenty years after the State has been known to be capable of supporting such vast herds of stock the impression should prevail that stock cannot be grown. It can only be explained by taking into the account that just after the close of the war the price of cotton ran so high that it dazed the farming community so completely that they parted with all of their stock and went to raising cotton. We venture the assertion, however, that there is scarcely a State in the Union that has superior natural facilities for this pursuit than Mississippi.

The question is often asked, is there any forage in Mississippi for cattle? We answer, yes, abundance of it; and if the farmers would only let the grasses grow instead of trying to kill them, Mississippi would in a few years become one of the most important grazing States in the Union. In spite of their efforts, however, the grasses are gradually gaining ground; and many of them are now so perfectly scattered that the land will rapidly become "set" in them when not in actual cultivation. These grasses, while largely different from those familiar to the stock-growers of the North and West, are as nutritious and valuable feed-stuffs as many of the most highly prized grasses of those regions. The variety of grazing is greater than it is farther north, just as vegetation is more luxuriant in warm countries than in cold. Besides this, many of the grasses so highly prized, such as orchard-grass, the clovers, timothy, and the millets, do as well here as anywhere else, so far as trials with them have been made. But, without these, we have a number of grasses, as Bermuda grass, Lespedeza or Japan clover, which grow wherever there is any soil to cling to, when they once get introduced. These afford pasture during the summer, fall, and winter. In the spring there is a variety of grasses which come on rapidly and afford most excellent pasturage. The Johnson grass makes one of the best of hays produced in any country.

These grasses are taking rapid possession of many sections of the State, in spite of the most strenuous efforts of the farmers to prevent their growing, and where they once get a hold they never leave. This very fact will soon compel our farmers to change their present system of agriculture and adopt one which can be and has been made, in the State where adopted, more profitable than growing cotton.

We herewith present a table giving the relative values of most of the grasses of any importance growing in this and other Southern States. It is taken from the Farmer's Book of Grasses, by Dr. D. L. Phares, and was originally abridged from the United States Department of Agriculture Reports. This little manual by the doctor gives more reliable information concerning Southern grasses than can be had from any other source available to the farming class, so far as I am aware. It cannot be too highly recommended.

A glance at this table will show the relative value of these grasses per ton of dry hay. The values are fixed by chemical analysis. Any one who has not given the matter much consideration will be surprised to see the high feed values of many of our Southern grasses. Take a number of those which grow luxuriantly in almost every soil in the State, as Lespedeza or Japan clover, Mexican clover, Bermuda grass, Johnson grass, red-top or herd grass, orchard grass, cane-brakes, crab-grass, and several others which will occur to any farmer, and the conclusion must be that they are excellent feed-stuffs. Our resources as a feed-producing State are almost unlimited; and as these grasses spread, as they are doing and sure to continue to do, our ability for raising stock will correspondingly increase. The most aggressive and progressive farmers at present in the State are those who are turning their attention to cattle raising.

Table giving relative cash value of various grasses, per ton of dry substance.

Common vetch. *Vicia sativa*	$28 97
Beggar lice. *Desmodium molle*	21 02
Japan clover. *Lespedeza striata*	20 35
Blue thistle. *Echium vulgare*	14 77
Ribwort plantain. *Plantago*	17 83
Mexican clover. *Richardsonia*	13 40
Satin grass. *Muhlenbergia glomerata*	23 13
Knot grass. *Muhlenbergia*	19 00
Drop-seed grass. *Muhlenbergia diffusa*	15 83
American canary grass. *Phalaris*	19 49
Vanilla grass. *Hierochloa*	19 12
Schrader's grass. *Bromus unioloides*	18 77
California broom grass. *Bromus carinatus*	15 48
Common cheat or chess. *Bromus secalinus*	17 03
Yard or crow-foot grass. *Eleusine*	13 41
Bermuda grass. *Cynodon*	17 62
Smut grass. *Sporobolus Indicus*	17 35
Panicum gibbum	18 08
proliferum	16 59
sanguinale. Crab grass	14 45
divaricatum	14 51
jumentorum. Guinea grass	14 01
Crus-galli. Barnyard grass	14 32
obtusum	12 93
capillare. Witch grass	14 97
dichotomum	13 89
agrostoides. Munro grass	14 66
anceps	12 99
Texanum	13 06

Panicum virgatum. Switch grass	$12 63
filiforme	11 65
Sorgum halapense. Johnson grass	17 21
nutans. Wood grass	10 37
Poa pratensis. Blue-grass	17 07
serotina. English blue-grass	15 40
compressa. Fowl meadow grass	16 25
Triticum repens. Quack grass	17 97
Uniola latifolia	14 13
Festuca pratensis. Fescue grass	16 91
Agrostis exarata. Native red top	16 71
Spartina cynosuroides. Marsh grass	16 41
Glyceria nerrata. Fowl meadow grass	15 90
aquatica. Reed meadow grass	14 90
Avena striata. Mountain oat grass	16 37
Tripsacum dactyloides. Gama grass	15 35
Bouteloua oligostachya. Gramma grass	15 97
Anthoxanthum odoratum. Vernal grass	15 57
Setaria setosa. Bristle grass	13 63
Dactylis glomerata. Orchard grass	15 65
Paspulum lævе. Water grass	14 87
præcox. Early grass	14 46
Andropogon furcatus. Blue joint grass	15 62
scoparius. Brown grass	13 44
macrourus. Brown grass	13 79
argenteus. Silver beard grass	13 57
Virginicus. Broom grass	10 64
Dactyloctenium Egyptiacum. Crow-foot	16 05
Tricuspis purpurea. Purple top	15 41
sesleroides. Tall purple grass	12 49
Danthonia compressa. Wild oat grass	15 35
spicata. Wild oat grass	14 36
Leptochloa mucruata. Feather grass	13 17
Cinna arundinacea. Reed grass	13 82
Elymus Canadensis. Wild rye grass	12 79
Aristida pupurascens. Purple beard grass	13 29
Scirpus eriophorus. Wooly sedge	12 87
Hay, cut in bloom	17 92
Hay, cut after bloom	15 94

In order to enable those who may have the inclination to study these feed-stuffs from a more scientific standpoint, and who may perhaps wish to adopt a system of rational feeding, we introduce the tables of proximate composition of agricultural products. These figures have been obtained principally from the "*Land wirthschaftlicher Kalender*," from analyses by Professors Wolff and Knop, of Germany, and are reliable.

Our farmers have not only lost much stock by careless feeding of "very rich" food, but through ignorance have wasted vast amounts of food. He who expects to feed to animals as much cow-pease or cotton-seed meal as he does corn or oats, may expect not only waste of materials, but, in many cases, the loss of his animals. These foods are so highly concentrated that it is an easy matter for an animal to eat too much of them. It has been said that green pea-vines will kill cattle, which is true. So will clover, green fodder, cotton seed, oats, wheat, and a dozen other excellent feed-stuffs if fed in excess. The pea-vine is perhaps a little more dangerous, because more highly relished by stock. These all affect stock in the same manner, and loss can be prevented from this cause only by rational feeding.

TABLE I.—*Showing proximate composition of agricultural plants and products.*

Substance.	Water.	Organic matter.	Ash.	Albuminoids.	Carbo-hydrates.	Crude fiber.	Fats, &c.
GREEN FODDER.	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*
Grass, before blossom	75.0	22.9	2.1	3.0	12.9	7.0	0.8
Grass, after blossom	69.0	29.0	2.0	2.5	15.0	11.5	0.7
Red clover, before blossom	83.0	15.5	1.5	3.3	7.7	4.5	0.7
Red clover, full blossom	78.0	20.3	1.7	3.7	8.6	8.0	0.8
White clover, full blossom	80.5	17.5	2.0	3.5	8.0	6.0	0.8
Swedish clover, early blossom	85.0	13.5	1.5	3.3	5.7	4.5	0.6
Swedish clover, full blossom	82.0	16.2	1.8	3.3	6.3	6.6	0.6
Lucern, very young	81.0	17.3	1.7	4.5	7.8	5.0	0.6
Lucern, in blossom	78.0	24.0	2.0	4.5	7.0	12.5	0.7
Sand lucern, early blossom	78.0	20.1	1.9	4.0	6.6	9.5	0.8
Esparsette, in blossom	80.9	18.5	1.5	3.2	8.8	6.5	0.6
Incarnate clover, in blossom (*Trifolium incarnatum*)	81.5	16.9	1.6	2.7	6.7	7.5	0.6
Yellow clover, in blossom (*Medicago lupulina*)	80.0	18.5	1.5	3.5	9.0	6.0	0.8
Serradella, in blossom (*Ornithopus sativus*)	80.0	18.7	1.3	3.6	7.0	8.1	0.4
Vetches, in blossom	82.0	16.2	1.8	3.1	7.6	5.5	0.6
Pease, in blossom	81.5	17.0	1.5	3.2	8.2	5.6	0.6
Oats, early blossom	81.0	17.6	1.4	2.3	8.8	6.5	0.5
Rye	72.9	25.5	1.6	3.3	14.9	7.3	0.9
Maize, late, end of August	84.3	14.6	1.1	0.9	8.7	5.0	0.5
Maize, early, end of August	82.2	16.7	1.1	1.1	10.9	4.7	0.5
Hungarian millet, in blossom	65.6	32.0	2.4	5.9	15.0	11.5	1.5
Sorgum saccharatum	74.0	25.1	0.9	2.5	15.3	7.3	1.4
Sorgum vulgare	77.3	21.6	1.1	2.9	11.9	6.7	(?)
Field spurry in blossom	80.0	18.0	2.0	2.3	10.4	5.3	0.7
Cabbage	89.0	9.8	1.2	1.5	6.3	2.0	0.4
Cabbage stumps	82.0	16.1	1.9	1.1	12.2	2.8	0.8
Field-beet leaves	90.5	6.7	1.8	1.9	4.6	1.3	0.5
Carrot leaves	82.2	14.2	3.6	3.2	8.0	3.0	1.0
Poplar and elm leaves	70.0	28.0	2.0	6.0	15.5	6.5	1.5
Artichoke stem	80.0	17.3	2.7	3.3	10.6	3.4	0.8
Rape leaves	Dry.	75.5	24.5	20.0	47.5	8.0	2.0

TABLE II.—*Showing proximate composition of agricultural plants and products.*

Substances.	Water.	Organic matter.	Ash.	Albuminoids.	Carbo-hydrates.	Crude fiber.	Fat, &c.
ROOTS AND TUBERS.	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*	*Pr. et.*	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*
Potato	95.0	24.1	0.9	2.0	21.0	1.1	0.3
Jerusalem artichoke	80.0	18.9	1.1	2.0	15.6	1.3	0.5
Turnips, chervil (*Körbelrübe*)	76.0	23.1	0.9	3.2	17.0	1.0	0.6
Kohl-rabi	88.0	10.8	1.2	2.3	7.3	1.2	0.2
Field-beets (3 pounds weight)	88.0	11.1	0.9	1.1	9.1	0.9	0.2
Sugar beets (one-half pound)	81.5	17.7	0.8	1.0	15.4	1.3	0.1
Rutabagas (about 3 pounds)	87.0	12.0	1.0	1.6	9.3	1.1	0.1
Carrot (about one-half pound)	85.0	14.0	1.0	1.5	10.8	1.7	0.2
Giant carrot (1 to 2 pounds)	87.0	12.2	0.8	1.2	9.8	1.2	0.2
Turnips (*Stoppelrübe*)	91.5	7.7	0.8	0.8	5.9	1.0	0.1
Turnips (*Turnipsrübe*)	92.0	7.2	0.8	1.1	5.1	1.0	0.1
Parsnip	88.3	11.0	0.7	1.6	8.4	1.0	0.2
Pumpkin	94.5	4.5	1.0	1.3	2.8	1.0	0.1
GRAINS AND SEEDS.							
Rice	14.6	84.9	0.5	7.5	76.5	0.9	0.5
Winter wheat	14.4	83.6	2.0	13.0	67.6	3.0	1.5
Wheat flour	12.6	86.7	0.7	11.8	74.1	0.7	1.2
Spelt	14.8	81.3	3.9	10.0	54.8	16.5	1.5
Winter rye	14.3	83.7	2.0	11.0	69.2	3.5	2.0
Rye flour	14.0	84.4	1.6	10.5	72.5	1.5	1.6
Winter barley	14.3	83.4	2.3	9.0	65.9	8.5	2.5
Summer barley	14.3	83.1	2.6	9.5	66.6	7.0	2.5
Oats	14.3	82.7	3.0	12.0	60.9	10.3	6.0
Maize	14.4	83.5	2.1	10.0	68.0	5.5	7.0
Millet	14.0	83.0	3.0	14.5	62.1	6.4	3.0

TABLE II.—*Showing proximate composition of agricultural plants, &c.*—Continued.

Substances.	Water.	Organic matter.	Ash.	Albuminoids.	Carbo-hydrates.	Crude fiber.	Fat, &c.
GRAINS AND SEEDS—Continued.	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*
Buckwheat	14.0	83.6	2.4	9.0	59.6	15.0	2.5
Vetches	14.3	83.4	2.3	27.5	49.2	6.7	2.7
Peas	14.3	83.2	2.5	22.4	52.3	9.2	2.5
Field-beans	14.5	82.0	3.5	25.5	45.5	11.5	2.0
Lentils	14.5	82.5	3.0	23.8	52.0	6.9	2.6
Lupines	14.5	82.0	3.5	34.5	33.0	14.5	6.0
Acorns, without shell, dry	20.0	78.4	1.6	5.0	68.8	4.6	4.3
Acorns, with shell, fresh	56.0	43.0	1.0	2.0	36 5	4.5	2.3
Chestnuts, without shell, fresh	45.2	49.0	1.8	3.0	45.2	0.8	2.5
Madia seed	8.4	86.9	4.7	22.9	46.0	18.0	41.0
Flaxseed	12.3	82.7	5.0	20.5	55.0	7.2	37.0
Rape seed	11.0	85.1	3.9	19.4	55.4	10.3	40.0
Hemp seed	12.2	83.6	4.2	16.3	15.2	12.1	33.6
Poppy seed	14.7	78.3	7.0	17.5	54.7	6.1	41.0
Horse-chestnut	30.0	68.8	1.2	10.5	58.3	4.0	2.30
Cow-pea, black	.....	.....	...	25.37	63.81	.....	1.62
Cow-pea, yellow	.....	.....	.....	28.50	59.49	.....	1.68
Cotton seed, decorticated	.....	.....	.....	31.00	18.30	.....	12.30
Cotton seed, raw	.....	.....	.....	22.80	11.50	.....	29.80
COFFEE AND TEA.							
Coffee bean	12.0	93.0	7.0	10.0	49.0	34.0	12.6
Chocalate bean	11.0	85.0	4.0	20.0	52.0	13.0	14.0
Black China tea	15.0	79.0	6.0	5.0	32.0	40.0	2.0
Green China tea	15.0	79.0	6.0	5.0	27.0	45.0	3.0

TABLE III.—*Showing proximate composition of agricultural plants and products.*

Substances.	Water.	Organic matter.	Ash.	Albuminoids.	Carbo-hydrates, &c.	Crude fiber.	Fat, &c.
HAY.	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*
Meadow, medium quality	14.3	79.5	6.2	8.2	41.3	30.0	2.0
Aftermath	14.3	79.2	6.5	9.5	45.7	24.0	2.4
Red clover, full bloom	16.7	77.1	6.2	13.4	29.9	35.8	3.2
Red clover, ripe	16.7	77.7	5.6	9.4	20.3	48.0	2.0
White clover, full bloom	16.7	74.8	8.5	14.9	34.3	25.6	3.5
Swedish, or Alsike clover (*Trifolium hybridum*)	16.7	75.0	8.3	15.3	29.2	30.5	3.3
Swedish, or Alsike clover, ripe	16.7	78.3	5.0	10.2	23.1	45.0	2.2
Lucern, young	16.7	74.6	8.7	19.7	32.9	22.0	3.3
Lucern, in blossom	16.7	76.9	6.4	14.4	22.5	40.0	2.5
Sand lucern, early blossom	16.7	77.2	6.1	15.2	26.9	35.1	3.0
Esparsette, in blossom	16.7	77.1	6.2	13.3	36.7	27.1	2.5
Incarnate clover, in blossom	16.7	76.1	7.2	12.2	30.1	33.8	3.0
Yellow clover, in blossom	16.7	77.8	6.0	14.6	36.5	25.2	3.3
Vetches, in blossom	16.7	75.0	8.3	14.2	35.3	25.5	2.5
Peas, in blossom	16.7	76.3	7.0	14.3	36.8	25.2	2.6
Field spurry, in blossom	16.7	73.8	9.5	12.0	39.8	22.0	3.2
Field spurry, after blossom	16.7	75.5	7.8	7.8	41.7	26.0	2.5
Serradella, after blossom	16.7	77.7	5.6	14.6	29.3	33.9	1.5
Serradella, before blossom	16.7	75.8	7.5	15.3	37.2	26.1	1.9
In blossom:							
Italian rye grass	14.3	77.9	7.8	8.7	51.4	16.9	2.8
Timothy	14.3	81.2	4.5	9.7	48.8	22.7	3.0
Early meadow grass	14.3	83.3	2.4	10.1	47.2	25.9	2.9
Crested dog's-tail	14.3	80.2	5.5	9.5	48.0	22.6	2.8
Soft broom grass	14.3	80.7	5.0	14.8	35.0	31.0	1.8
Orchard grass	14.3	81.1	4.6	11.6	40.7	28.9	2.7
Barley grass	14.3	80.1	5.3	9.6	42.0	27.2	2.0
Meadow foxtail	14.3	79.0	6.7	10.6	39.5	29.0	2.5
Oat grass, or French rye	14.3	75.8	9.9	11.1	35.3	29.4	2.7
English rye grass	14.3	79.2	6.5	10.2	38.9	30.2	2.7
Harter Schroingle (Festuca?)	14.3	81.0	4.7	10.4	37.5	33.2	2.9
Sweet-scented vernal grass	14.3	80.2	5.4	8.9	40.2	31.2	2.9
Spear grass, Kentucky blue	14.3	80.2	5.1	8.9	39.1	32.6	2.3

TABLE III.—*Showing proximate composition of agricultural plants, &c.*—Continued.

Substances.	Water.	Organic matter.	Ash.	Albuminoids.	Carbo-hydrates, &c.	Crude fiber.	Fat, &c.
HAY—Continued.	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*	*Pr. ct.*
In blossom:							
Velvet grass	14.3	80.2	5.5	9.9	36.7	33.6	3.1
Rough meadow grass (*Poa trivialis*)	14.3	78.6	7.1	8.4	37.6	32.6	3.2
Yellow oat grass (*Avena flavescens*)	14.3	79.8	5.9	6.4	42.6	30.8	2.2
Quaking grass (*Briza media*)	14.3	78.3	7.4	5.2	42.8	30.3	2.6
Average of all grasses	14.3	79.9	5.8	9.5	41.7	28.7	2.6
STRAW.							
Winter wheat	14.3	80.2	5.5	2.0	30.2	48.0	1.5
Winter rye	14.3	82.5	3.2	1.5	27.0	54.0	1.3
Winter spelt	14.3	79.7	6.0	2.0	27.7	50.5	1.4
Barley	14.3	80.2	5.5	2.0	29.8	48.4	1.4
Summer barley	14.3	78.7	7.0	3.0	32.7	43.0	1.4
Summer barley, with clover	14.3	77.7	8.0	6.0	34.7	37.5	1.7
Oat	14.3	80.7	5.0	2.5	38.2	40.0	2.0
Vetch fodder	14.3	79.7	6.0	7.5	28.2	44.0	2.0
Pea	14.3	81.7	4.0	6.5	35.2	40.0	2.0
Bean	17.3	77.7	5.0	10.2	33.5	34.0	1.0
Lentil	14.3	79.2	6.5	14.0	27.2	36.6	2.0
Lupine	14.2	81.4	4.4	4.9	34.7	41.8	1.5
Maize	14.0	82.0	4.0	3.0	39.0	40.0	1.1
CHAFF AND HULLS.							
Wheat	14.3	73.7	12.0	4.5	33.2	36.0	1.4
Spelt	14.3	77.2	8.5	2.9	32.8	41.5	1.3
Rye	14.3	78.2	7.5	3.5	28.2	46.5	1.2
Barley	14.3	72.7	13.0	3.0	38.7	30.0	1.5
Oat	14.3	67.7	18.0	4.0	29.7	34.0	1.5
Vetch	15.0	77.0	8.0	8.5	32.5	36.0	2.0
Pea	14.3	79.7	6.0	8.1	36.6	35.0	2.0
Bean	15.0	77.0	8.0	10.5	29.5	37.0	2.0
Lupine	14.3	82.9	2.8	2.5	47.2	33.0	2.5
Rape	10.3	77.5	8.5	3.5	40.0	34.0	1.6
Maize cobs	10.3	83.2	2.8	1.4	44.0	37.8	1.4

These analyses, of course, are not intended to show more than the nutritive value of the feed-stuffs. It gives us no indication of the readiness with which stock will eat the grasses. There are, in many things which have a high nutritive value, organic compounds, such as alkaloids, &c., which may render the article unsuited for food. This is very rarely the case with grasses, however, and the only thing to be inquired into is, Do stock relish the plant? which can only be settled by trial.

One important consideration in favor of the grasses of Mississippi is that they withstand drought. Especially is this true of Lespedeza and Bermuda grass. During the present year we have had a drought which is seldom equaled. No rain has fallen in sufficient quantities to wet the soil from about June 20 until October 15. Blue grass or any of the grasses common farther north have been parched and worthless. It is extremely doubtful whether the celebrated Blue-grass region of Kentucky could stand such a drought without keeping the stock entirely upon hay. And yet in Mississippi the Lespedeza and Burmuda grasses have remained comparatively green, while clover and timothy have been killed by the drought. Besides these there are several other grasses which have withstood the drought almost equally well. This will be of the greatest value to stock-growers in the State. It is not once in twenty years that we have such a drought, and there is no fear that it will kill the grasses so completely as to cause loss of stock.

In conclusion, I would say that for variety, luxuriance of growth, richness of flavor, and value as feed-stuffs the grasses of Mississippi are probably not equaled by those of any section of this country. The stock will thrive upon them the whole year, and it is not necessary to feed more than two months of the year, thus giving the stock-growers of Mississippi an advantage over those of other sections of the country.

The experience and opinion of prominent stock-raisers in the State, here appended, are impressive and suggestive.

Mr. W. B. Montgomery, of Starkville, the largest breeder of Jersey cattle in the State, and one of the largest in the United States, says:

1. The smaller breeds of improved cattle succeed best here. It is more a question of agricultural development than of climate. The larger breeds, for their highest development, require rich and abundant feed. There is no climatic bar, only one of rich and nutritive grasses.

2. I know of no serious obstacle in the way of improved stock-farming. I know of no failure where stock-farming is intelligently pursued. The mildness of our climate constitutes a great advantage.

3. I have succeeded well with all the cultivated grasses, which I have tested, excepting timothy only. Our cultivated grasses will not bear, however, close grazing without injury during long protracted droughts in summer and early fall.

4. Clovers and blue-grass do best on a stiff lime soil, red top or herd's grass on low damp lands.

Mr. Mat Mahorner, of Macon:

My experience with improved cattle is very limited, except Jerseys, which I consider preferable for good milk and butter. I believe the Devon to be an excellent general-purpose animal, making excellent oxen, good beef, and in many instances fair milkers. The larger breeds will do well where the pasturage is rich enough and proper attention is given. I cannot see any reason why improved stock-farming cannot be made as profitable on our cheap lands, with mild winters, as it is where lands are worth from $100 to $500 per acre, and with winters from five to seven months. I fear the desire to become rich in a short time, which many expect to accomplish by raising cotton, is the greatest difficulty in the way in this State. It has been my pleasure to visit some herds in the New England States this summer that are considered profitable on lands valued as high as $500 per acre.

Mr. M. Jenkins, Meridian:

I know of no difficulties in the way of successful stock-farming in Mississippi. Of the improved breeds, Jersey cattle are the best for butter and milk, and Holsteins for milk and beef.

Dr. W. E. Oates, Warren County:

After several years' experience in breeding and raising thoroughbred Jersey cattle, Southdown sheep, Berkshire and Poland-China swine, I do not hesitate to say that Warren County, Mississippi, is equal, if not superior, in some respects, to the famous blue-grass region of Kentucky. Clovers luxuriate in our soil; the Bermuda grass covers nearly all our hills and valleys, and it will pasture acre for acre more stock in summer than the blue-grass lands of Kentucky; its power to resist drought is greater, and analysis places it, pound for pound, in value with blue-grass. On our meadow land as much as 3½ tons per acre have been cut of very superior hay. My herd of Jersey cattle, yet quite young, is as promising as can be found in the United States—rather a broad assertion, but this is the opinion of good judges. The butter tests I have made bear me out in the assertion. (Handbook of Mississippi, p. 28.)

Mr. C. D. Kelly, Winona:

From observation and experience I believe that the improved breeds of live stock of all kinds will do as well in Mississippi, with the same treatment, as they will in any part of the United States. I raised in 1881 a lamb from a good common ewe by a full-blood Cotswold ram (raised in Carroll County, Mississippi), which weighed 110 pounds at five months old. He had the run of a Bermuda-grass pasture, and no feed after March. The only drawback I find to improved cattle and sheep in Mississippi is accli-

mating fever, and this may be avoided by purchasing from a local breeder stock already acclimated.

Mr. C. F. Sherrod, Noxubee County, writes of the grasses:

My plantation is prairie and timbered land, impregnated with phosphate of lime. The rotten limestone underlying this whole prairie is filled with shells, and makes a good top-dressing for grain or grass. I have been raising clover, lucern, and grasses for the last twenty-five years. In that time I have seeded over 1,000 acres of red clover, 50 acres of lucern, 100 acres of timothy, 40 acres of blue grass, 50 acres of herd's grass, 20 acres of tall meadow oat grass, 40 acres of orchard grass, and smaller quantities of various other grasses. The red clover I regard as the best adapted to our county as a forage crop. It yields uniformly about 1½ tons of hay per acre, and a second crop furnishes 2 to 3 bushels of seed. When once seeded it is almost indestructible, and renews itself from seed. I have in my orchard now under the trees a good stand of clover that was sown over thirty years ago, and was cultivated in cotton and grain for ten years before the orchard was put out. Red clover is to be the great renovator of the prairies, which are so fast failing to produce remunerative crops of cotton and corn. A few years in clover increases their productive power 50 per cent. Lucern is a valuable crop, comes in earlier by two weeks than the clover, but it is not as much relished by stock as red clover, either in the green state or in hay. It does not renew itself from the seed, and if not well protected from weeds, by repeated mowings, will soon run out. Timothy and the other hay grasses mentioned have proven failures with me. I am cultivating a native grass, resembling the fowl meadow grass, that promises to be a valuable acquisition, fulfilling all the requirements of a good grass. The Bermuda, which was regarded as a pest and a nuiances, has grown immensely in popular favor, and is justly regarded as the very best grazing grass in existence. I have about 100 acres sodded, and 200 head of horses and cattle cannot keep it down from middle of April until frost. It is all that can be desired as a grazing grass. It makes a soft, sweet hay that is very much relished by stock, but is wasteful to feed, as it is short, and much of it is pulled out of the rack and trodden under foot. The *Lespedeza striata*, a growth which made its appearance in our county within the last fifteen years, has proven a valuable acquisition. From 1st of August until frost it yields good grazing, and makes good hay, very fattening in quality. There are many valuable native grasses that are fast coming into notice, since the craze for cotton has subsided, and I hope to see the prairies of Mississippi develop into one of the finest stock countries in the United States.

Dr. J. R. Nolen writes of a grass he calls velvet grass, which is probably the European velvet grass:

It is certainly the best winter grass I ever saw, furnishing fine grazing the winter through, cold weather seeming to have no effect upon it. I grazed on my meadow through the winter up to the 1st of April, and in June mowed the grass, saving a very fine lot of hay and about 200 bushels of seed. I will sod 50 acres more this fall. Stock of all kinds are fond of the hay and grazing, while chickens eat the green grass. It will grow on most any kind of land, and I have known water to stand on it for months, and still it did well.

Mr. C. D. Kelly, Winona, writes of grass:

In September, 1875, I sowed 5 acres of branch land in orchard grass, red and white clover, and herd's-grass (red top), and then set out a small piece of Bermuda sod about 8 feet apart on 3 acres of the 5, and a few bunches scattered over the other 2 acres. Let go to seed in 1876, and in the spring of that year I commenced grazing it, and have been grazing it ever since through the summer. I have never kept less than twelve head of grown cattle and horses on it at a time, and the last three years have had on an average twelve head of grown cattle, and a good part of the time eleven head of sheep, and part of the time forty head of sheep at night. In the spring of

1880 everything had about disappeared except the white clover and Bermuda grass, and these seem to be getting better every year. It is on a small branch, and four-fifths of it is inundated at every heavy rain. In 1875 I sowed 9 acres of branch land in orchard grass, red and white clover, and herd's-grass, and let it go to seed in 1876. In 1877 I mowed 2 tons to the acre, on 8 acres, one acre being too rough to mow. In 1879 I mowed off of the best acre 5,252 pounds of cured hay—no manure being used. It has averaged each year about 1¼ tons to the acre. My opinion, based on observation and experience, is that red clover, white clover, lucern, orchard grass, herd's-grass (red top) will grow and do as well in Mississippi on the same grade of land as they will in any State of the Union. White clover and Bermuda grass make the best permanent summer pasturage, and will stand more grazing than any of the grasses. There is no doubt that Bermuda grass, well set on our best lands, will graze from April to November four steers to the acre, while in Illinois and Kentucky it takes two acres for one steer.

The Aberdeen Examiner, a newspaper which has consistently and persistently urged the farmers of the prairie region to turn their attention to grass and stock, in a recent issue chronicles the success of Mr. J. W. Howard in this industry. It states that Mr. Howard has a place of 1,100 acres, 52 acres of which is woodland pasture, carpeted with Japan clover throughout its whole extent, and continues:

Those who have had occasion to doubt the fattening excellence of this great boon to the South—the first and only pasturage growth that ever covered our prairie woodlands—should have looked with us upon the sleek, fat, and beautiful cattle that fed upon it, and that have not had any other food during the long, hot, dry summer just behind us. There were about ninety head of cows and heifers feeding and thriving upon this growth, and enough calves, mules, horses, and hogs to swell the number of animals to nearly two hundred, and their condition would have gladdened the eye of a herdsman from the blue-grass region. Two of his meadows, aggregating nearly a hundred acres, are devoted to a native grass of great richness, upon which all kinds of stock thrive wonderfully, whether fed in pasture or barn. From these meadows he was cutting the second crop this season, and estimates the yield at 3 tons to the acre for the two mowings. * * * This is becoming a great grass and stock country, and our prophecies of 1880, that the next five years would see grass-growing and stock-raising one of the leading industries of the Mississippi prairie, is certain to be realized.

SHEEP RAISING.

The statistician of the Department of Agriculture estimated the number of sheep in Mississippi, on the 1st of January, 1882, as 290,571, valued at $421,328, at an average price of $1.45 per head. In 1850 the number of sheep in Mississippi was 304,929; in 1860, 352,632; in 1870, 232,732; and in 1880, 287,694. The number of pounds of wool produced in 1850 was 559,619; in 1860, 665,959; in 1870, 288,285; and in 1880, 734,643. The production of wool increased in the last decade to the large extent of 446,358 pounds. It therefore appears that, although the number of sheep has not yet reached the ante-bellum figures, the production of wool is now the highest in the State's history. This is best accounted for by the fact that sheep are now more extensively raised for wool than for home consumption or market, owing to the increase in the home consumption of the fiber by woolen mills recently established in the State. This is but another evidence of the good re-

sults which flow from the establishment of manufactures, which create a ready local demand for the raw product to be manufactured. The production of wool will steadily increase with the establishment of new mills; improved breeds will be introduced, more time and attention will be devoted to the industry, and better safeguards will be erected around it. The State is admirably adapted to successful sheep raising, and it only needs the establishment of woolen mills and the vigorous enforcement of friendly legislation to stimulate the industry until it assumes proportions commensurate with the favorable natural conditions which exist. As illustrating what may be done by raising sheep in this State, the following from the Greenville Times is of interest:

A cotton-planter of our acquaintance, in the lower part of this [Washington] county, has run a sort of side-show with sheep, with the following results:

Dr.

Eighty-six sheep, cost $4 each	$344 00
First shearing of same	7 60
Second shearing of same	4 15
Shearing 58 lambs	2 90
Of stock 3 died	12 00
Total cost	370 65

Cr.

By first clip (April)	$ 55 77
By second clip (fall)	60 00
By clip of lambs	32 94
By increase, 29 ewes	116 00
By increase, 31 bucks	93 00
Total yield	357 71

This is within $12.94 of 100 per cent. realized on the investment. This flock of sheep had the run of a Bermuda grass common and front yard.

The pine hills and level lands of Southern Mississippi are especially well adapted to sheep raising, and it is in this part of the State that the industry has attracted the most attention. Perry County at the last census had 15,764 sheep, and is entitled to the first place in this respect. Marion County comes next, with 14,981 sheep, and then Wayne County, with 12,338 head, while Greene and Harrison Counties have each more than 10,000 head. The remainder are quite evenly distributed throughout State.

Mr. J. A. Wetherbee writes that the industry is carried on quite extensively in the western and southern portions of Wayne County, and very successfully. He says that along the line of the Mobile and Ohio Railroad, and in the eastern portion of the county, there are very few sheep, owing to the number of dogs running at large, and suggests that if all persons having dogs were required to keep them confined, the business would be enlarged and become more profitable. The sheep are common stock.

Mr. J. T. Duckworth, of Williamsburg, says that there is little or no special attention paid to sheep raising in Covington County; that this part of the State possesses many advantages for sheep raising, including a fine summer range, and plenty of water, but the great trouble is the large number of dogs. He complains that present local and general legislation against this evil is not properly enforced. He considers the southdown the best breed for that section.

Mr. T. H. Smith, of Lawrence County, says:

There is generally very little attention paid to sheep in this county. They make their own living, but little feed being given them, and yet they seem to do moderately well. I know of no improved breeds here, only the common stock. I think the pine hills here would make fine sheep-walks, as sheep live through the winter here with little or no feed. The enforcement of a strict dog law would be a great advantage.

Mr. W. B. Montgomery thinks the smaller breeds of sheep, the Merino and Southdown, best adapted to the State, for the reasons he has given elsewhere for preferring the smaller breeds of cattle.

Mr. Mat Mahorner prefers the Southdown for mutton and early lambs and the grade Merino for wool.

The foregoing facts give an idea of sheep raising in Mississippi. There seems to be nothing except dogs in the way of profitable sheep raising in the State. It has been suggested that a dog tax would greatly reduce the number of worthless dogs in the State. The present statute for the protection of wool-growers provides that any dog found prowling and straying alone and from the premises of the owner, and found either chasing or killing sheep, shall be deemed and held to be a sheep-killing dog, and any person so finding such dogs may kill them, and shall not be held liable to the owner for so doing. Also that the owner of any dog found chasing or killing sheep, who, after notice of the fact, shall fail to kill, or refuse to allow killed, such dog so found chasing or killing sheep, shall be held liable for three times the amount of all losses or damages occasioned by such dog chasing or killing sheep, to be recovered before any court of competent jurisdiction.

FORESTS AND FOREST TREES OF MISSISSIPPI.

The arboreal flora of Mississippi is remarkable for the dense growth of its forest trees, the height and size of timber trees, their great variety; for the prevalence of species common only to the Gulf region; for the extensive growth of hard woods, their kind and value, and above all, for the great belts of pine forests. The forests of the State constitute a mine of untold wealth, which has as yet attracted comparatively little attention from its citizens. While the States of the North and West have been planting forests, and while the General Government bestows a liberal bounty for the planting of forest trees upon the public domain, Mississippi has done little to preserve its bountiful supply of valuable woods, and nothing whatever to replete with a new growth the forests already destroyed.

When first visited by white men the State was an unbroken forest, save limited stretches of prairie, with gigantic trees, undergrowth, wild flowers, cane, and wild grape-vines in unlimited extent. Since its settlement the woodman's axe has destroyed many a fine forest, a result often rendered necessary by the demands of agriculture, but which, it must be admitted, did not always stop with this necessity, but was continued with little care or thought of the value of forests. The destruction of forests still necessarily continues to a certain extent, but there is fortunately a growing appreciation of their value and a public sentiment which will do much to preserve them for present and future generations. The illiberal policy of rapidly exhausting the cleared lands by a reckless and improvident system of agriculture and abandoning them for new clearings, to be in turn rapidly exhausted, is beginning to be understood and appreciated. The restoration of exhausted lands now going on will do much to save the forests from further depletion.

The statistics of wood and timber consumption in the United States are full of meaning, and suggest what is now generally admitted, that soon the country must look to the South for its principal supply of useful and ornamental woods. At a recent session of the American Forestry Congress the Commissioner of Agriculture, Hon. George B. Loring, also president of the Congress, called public attention to this fact. He said:

> In the near future the pine forests of the Gulf States will have to be depended upon for lumber. Much remained to be done for the care of forests, much timber being wasted by want of care in burning and cutting. The public mind should be aroused to the importance of the subject.

The immense importance, therefore, not only to the State but to the country at large of the forests of pine and hard woods, which abound in almost every section of Mississippi, ought to be fully appreciated This valuable bounty of nature should receive the protecting care of legislation, State and national, the support of public sentiment, and the guardianship of every citizen. Self interest, it seems, would be sufficient to insure the protection of individual forests and the national and State governments should enforce a like protection upon their respective lands. Every year the value of the forests will increase, and there should be a corresponding increase in a sentiment favorable to their protection. Not only should friendly legislation protect the forests as far as possible, but it should also encourage the planting upon the State lands when sold of pecan, white oak, walnut, chestnut, and other useful trees. It is none too early to begin this work, and if begun at once and diligently prosecuted the advantages may be ready to be reaped by the time the present supply of timber is exhausted sufficiently to produce inconvenience. Mississippi has a statute sufficiently stringent, if enforced, for the protection of valuable and ornamental trees and shrubs. The increasing value of such growth should induce owners to insist upon

a more rigid enforcement of this timely legislation, and thus promote a more general regard for this class of individual and national wealth than has obtained heretofore.

Immense acquisitions of valuable pine forests in Southern Mississippi have of late been made by investors from abroad, who understand and appreciate that the trees alone are worth many times the present Government price. As many as seventy large, tall, pine trees have been frequently counted on a single acre of land that the Government is selling at $1.25 per acre. The estimated yield per acre of these fine forests varies from 6,000 to 30,000 feet of lumber. This Long-leaf Pine Region lies south of the Vicksburg and Meridian Railroad, and extends in Mississippi to the Alabama line on the east, to the Gulf of Mexico and the Louisiana line on the south, and to the bluff formation and Louisiana line on the west. The region of mixed growth adjoins the pine belt on the north, while the bottoms of the State generally, and the Yazoo delta in particular, contain the large deciduous forests. Generally speaking, the sandy lands in the State incline to the different kinds of pine, and the valleys skirting the streams to large, tall moisture-loving trees. The oaks predominate among the deciduous trees, and are in great variety.

The statistics of the Census give the following as the pine supply of Mississippi:

Estimated amount of merchantable pine standing May 31, 1880.

LONG-LEAFED PINE. (*Pinus australis.*)

STANDING PINE.

	No. of feet (board-measure).
Standing pine in region west of Pearl River, tributary to the Illinois Central Railroad	6,800,000,000
East of Pearl River	7,600,000,000
Region of mixed growth, exclusive of 200,000 acres injured by the manufacture of turpentine	3,800,000,000
Total	18,200,000,000
Cut for the census year ending May 31, 1880	108,000,000

In this estimate no account is made of small timber standing on some 2,912,000 acres which have been cut over, and from which the merchantable pine has been practically removed.

SHORT-LEAFED PINE. (*Pinus mitis.*)

Standing pine in the northeastern belt	1,600,000,000
Standing pine in northern region of mixed growth	5,175,000,000
Total	6,775,000,000
Cut for the census year ending May 31, 1880	7,775,000

The estimated consumption of wood for domestic purposes in Mississippi amounts to 5,090,758 cords, valued at $7,145,116 per annum. The value of mill products, such as lumber, laths, shingles, staves, &c., per

annum amounts to $1,920,335. These two items will give an idea of the large annual drain upon the forests of the State.

It is to be regretted that the forest wealth of Mississippi has never been made the object of special study by a competent observer. It is a mine of wealth which, however, awaits and merits exploration and study. In the absence of such data a statement of some of the forest trees of Mississippi is here given.

FOREST TREES OF MISSISSIPPI.

MAGNOLIACEÆ.

MAGNOLIA GRANDIFLORA. (Magnolia; Big Laurel; Bull Bay.)

Peculiar to the southern part of State, in a wild state, and not found north of latitude 32° 30′. In the cool, moist bottom lands of the southern pine region it is quite common, often attaining a height of 50 to 75 feet. It is cultivated in other portions for its beautiful sweet-scented flowers and glossy evergreen foliage. Wood takes a good polish, and is valuable for ornamental purposes.

MAGNOLIA GLAUCA. (Sweet Bay; White Bay.)

Common on streams in coast region. Often from 50 to 80 feet high and 12 to 18 inches in diameter.

LIRIODENDRON TULIPIFERA. (Tulip Tree; Yellow Poplar.)

A valuable wood. Found in northern portions of State of good size, but of stunted growth farther south.

ANONACEÆ.

ASIMINA TRILOBA. (Papaw.)

Found throughout the State in a rich well-shaded soil; sometimes 10 and 12 inches in diameter. Bark used for making ropes and mats. Fruit edible, and it is believed susceptible of great improvement from cultivation.

TILIACEÆ.

TILIA AMERICANA. (White Wood; Bass Wood; Linden.)

On rich lands in interior part of State. Lumber used for laths, wagon boxes, and ornamental work. Bark used for making mats.

RUTACEÆ.

ZANTHOXYLUM CLAVA-HERCULIS. (Southern Prickly Ash; Hercules Club; Angelica Tree, &c.)

Common near coast, sparingly in other sections. Yellow wood, of fine grain, very strong and durable. Berries and bark used for toothache.

ILICINÆ.

ILEX OPACA. (American Holly; White Holly.)

In low lands generally throughout the State. Attains a large size in Yazoo delta. Wood valuable for inlaid work, and used for inside finish of coaches by the Illinois Central Railroad at McComb City shops, and considered a fine substitute for walnut.

RHAMNACEÆ.

ACER SACCHARINUM. (Sugar Maple.)

Found as far south as Clarke County. Occurs sparingly in the State.

ACER SACCHARINUM, *var.* NIGRUM. (Black Sugar Maple.)

Probably only another form of above species. Planted for shade tree.

ACER DASYCARPUM. (White Maple; Silver Maple.)

Found in northern part of State. Replaced in the southern part by *A. rubrum*, with which it is often confounded. An ornamental tree, and wood valuable for in-door work.

ACER RUBRUM. (Red Maple.)

Common on rich lands. In the Yazoo delta it has been found 5 feet in diameter, with a height of over 100 feet.

NEGUNDO ACEROIDES. (Box Elder.)

Found in interior of State, in alluvial soil. Planted for a shade tree. Wood used for ox-yokes, &c.

LEGUMINOSÆ.

GLEDITSCHIA TRIACANTHOS. (Honey Locust.)

Occurs throughout the State, and attains size of a tree in the Yazoo delta. Wood hard and durable. Used for wagon-hubs, posts, &c. Also valuable for forest culture.

CERCIS CANADENSIS. (Judas Tree; Red Bud.)

Grows along creeks and rich hill-sides in northern part of State. Wood quite compact.

ROSACEÆ.

PRUNUS AMERICANA. (Wild Plum.)

Occurs throughout the State, in alluvial soil. Sometimes has a diameter of one foot. The quality, size, and color of the fruit variable.

PRUNUS CHICASA. (Chickasaw Plum.)

Found extensively throughout the uplands. If not spontaneous, it is supposed that the aborigines must have introduced it. Many varieties of fruit ripening early and late, often well flavored, and very palatable.

PRUNUS CAROLINIANA. (Mock Orange; Wild Peach.)

Found in coast region. Sometimes cultivated for ornament.

PRUNUS SEROTINA. (Wild Cherry; Rum Cherry.)

Common in uplands. Often several feet in diameter. Fruit edible, but small. Wood valuable for inlaid work.

PRUNUS CORONARIA. (Wild Crab Apple.)

Found extensively in the uplands, especially in calcareous soils. Fruit small and very sour and hard. Used for preserves and apple butter. It is boiled with saleratus to remove acidity and bitterness.

CRATÆGUS ÆSTIVALIS. (May Haw; Apple Haw.)

Found throughout the State in rich lands. Fruit rather large, and used for making tarts and jellies. *Cratægus spathulata* (Hog's haw) and *C. flava* (Summer haw) are also found in the State.

HAMAMELACEÆ.

LIQUIDAMBAR STYRACIFLUA. (Sweet Gum; Red Gum.)

This important growth is exceedingly common in rich lands throughout the State. On the dry uplands it is the sweet gum proper, but on the moist bottoms, especially in the Yazoo delta, the heart enlarges greatly, with a fine grain and beautiful red color, and it is then the now famous red gum. This valuable hard wood deserves more than a passing notice. The immense supply of this wood, its durability, the beautiful polish which it takes, and its adaptability to supply the place of walnut and other high priced ornamental woods render any information touching its value and proper treatment of particular interest at this time. The warping propensities of this timber when young and when cut at the wrong season, have led to a popular belief, now rapidly disappearing, that it is useless as an ornamental wood. Prof. Lawrence Johnson, of Holly Springs, Miss., who has given a great deal of attention to this subject, in an interesting paper in the Scientific American, says that the red gum lumber of the Gulf region made of the heart wood of the timber, will never warp at all if cut at the proper season of the year, when the sap has ceased flowing. Continuing, he says:

Looking to its beauty, for, from its peculiar grains and cross grains it takes a finish no other known wood can take, *it is destined in the future to be the timber for inside finish.* The interior finish of churches and dwellings is tending again toward the old mediæval styles of showing the natural wood, instead of the shams of paint and plaster. For these purposes gum must excel. And as carving is again reviving as a means of ornamentation, *none will be found to excel it for that.* It is only rather tough to suit a workman's taste, who would rather have soft pine. But it does not splinter or split; and the carver can bring out designs with almost the sharpness of metal.

Why, then, would it not do for wood engraving? The supply of box is very low, and a substitute would be hailed with joy by the printers.

For all turned ware it must have peculiar adaptability. Though I have never seen bowls and cups turned of it, for these it must be far more appropriate than elm and maple, in common use. They split easily and take no polish. The posts for the high old-fashioned bedsteads, the legs of the old style of heavy dining tables and chairs, desks, and settees when made of this timber were considered exceptionally elegant, and of late years the demand for table and chair rounds and stair balusters manu-

factured from this material is very extensive. It turns readily and smoothly and takes an easy and excellent polish, and on account of its beauty, great strength, and durability is very much sought for. A turning factory in Chattanooga, Tenn., makes a specialty of this timber, and is doing a thriving business.

For furniture, therefore, it must finally rise to the highest place. It has *all* the desirable qualities—fine grain, compact and hard, and yet not so hard as to prevent its being easily worked, durable and strong, taking the finest polish and most elaborate finish, never cracks or splits, and above all is most attractive in color, rivaling walnut and mahogany in this respect. And remember, we have been all this time speaking of what lumbermen call clear stuff—the wood of the trunks alone.

In a mahogany forest as in a gum bottom you find the stems of trees shooting up a straight shaft of 40, 50, and 60 feet without a limb. The product of these tall shafts is all in the case of the gum that has yet gone to market. Of mahogany this clear stuff is of comparatively little value. Up among the branches, the knots contain the wood prized by the cabinet worker. And so with walnut. I have seen hundreds of walnut trees felled, and their large trunks left to rot, while raftsmen cut out only the knotty portions, which they could then afford to haul miles to the rivers, where their buoyant ash logs can be doubled and quadrupled in value by this rich freight. Red gum knots have yet to have a fair trial. The tree does not naturally abound in limbs and branches, like the walnut, but yet of nearly every tree a portion of that sort of lumber may be found. Knots vary in all kinds of lumber, and add to the beauty of furniture.

Beautiful strips of molding intended for ornamenting picture frames or other small work are sometimes to be seen of red gum. I have been told on making inquiry concerning their manufacture that it was a *secret*.

Similar moldings are to be seen in the coaches manufactured by the Ohio Falls Car Company, at Jeffersonville, Ind., are much admired, and generally considered to be made of mahogany.

This company says of this wood: "It takes easily an elegant polish and resemble olive. We call it American olive. It forms a splendid contrast with cherry and other woods. When care is taken in its use, it can be used safely and extensively. During the past three years we have used large quantities of it for panels and moldings in interior decoration."

This is the experience of the only car manufacturing company that has as yet given this wood a fair trial.

When all its many good qualities and few bad ones are taken into consideration, it will be seen that its possibilities are great, and, in view of its present abundance and the rapidly increasing scarcity of cherry, walnut, ash, oak, and other woods which have for so long held sway, it is safe to say that before many years they will have to abdicate in favor of red gum.

In a letter to Hon. Van H. Manning, of Holly Springs, Miss., Dr. Charles Mohr, of Mobile, presents the following interesting facts about red gum:

Attaining the size of the larger forest trees, from 2 to 3½ feet in diameter, and from 80 to 90 feet high, it is one of the most common of the timber trees throughout the central and upper portions of the Gulf States (Mississippi and Alabama). There in the rich low bottoms along the larger rivers, with a deep cold loamy soil, it arrives at its greatest perfection. It may be said that on the bottom lands of the Mississippi and Yazoo Rivers it is found in its best development and greatest abundance. A specimen of this timber exhibited at the Atlanta exposition had a label attached saying, "There are millions of feet of this in the Yazoo country." I can indorse this statement by my own observation in that region. The qualities of this timber are highly esteemed, it being of a fine grain, compact, but not too hard for working—durable, of a pleasing color, and admitting of a fine finish. It is certain that for the manufacture

of many articles of furniture, it takes a high rank amongst the hard woods. In view of its present abundance, and the increasing scarcity of the supply of wild cherry, walnut, ash, and other woods which furnish the chief supply for the industry, it is to be looked upon as one of the most important of the resources needed for these purposes. Whatever may be the objections to the use of the sweet gum grown in more northern latitudes, and of the younger growth, on account of its great liability to shrink, they lose their force in regard to the red gum. In my investigations of the forests and their products of the Gulf region made for the Tenth Census, I have given this point particular attention. As stated in my report I found that planks from 1½ to 2 inches in thickness and a length of 20 feet and over, have shrunk so little after an exposure of more than eight months to wind and weather (during the summer) as to be scarcely perceptible. To have the timber ready for immediate use, after its arrival, from the mill, it is, at the Mobile Furniture Manufacturing Fa tory, subjected to a process of seasoning in steam-heated kilns. Subjected in these drying chambers, heated by a coil of pipe of 1 inch in diameter and 1,000 feet in length, for several days in an atmosphere kept dry by constant condensation of the aqueous vapors thrown off, it is soon fit to be worked up in any shape and manner without danger of subsequent cracking or shrinking. The furniture factory at this place has chiefly been established for the utilization of this timber found on the Alabama and Tombigbee Rivers, and their tributaries. It is chiefly used for turning work, bedsteads, washstands, &c., which give much satisfaction. The enterprise here is in need and wants capital; however, it is well appointed and of considerable working capacity. I understand that in Chattanooga, Tenn., there is a similar establishment using red gum.

In the new industrial museum of the Department of Agriculture, Washington, D. C., arranged by me last summer, are fine specimens of this timber, to be seen amongst the woods of the Louisville and Nashville Railroad and Tennessee and Arkansas exhibits.

Rev. R. Abbey, of Yazoo City, who has given a great deal of attention to the subject of red gum and its uses, says:

You will observe the distinction I make between the two kinds of sweet gum—that in the alluvial bottom and that in creek and river bottoms. The difference is very marked. In several letters of mine which have found their way into the newspapers. I call the former by its more natural and appropriate name, *red gum*, and it is now pretty generally so known. From the samples I sent to Atlanta and various other experiments and tests, I have no hesitation in believing that the red gum is capable of receiving a high polish, quite superior to black walnut—indeed, fully equal, if not superior, to any timber in North America. The only objection I have ever heard against it is its tendency to warp in drying. Some of it warps badly, some slightly, and some not at all. I have hundreds of panels of fencing of it now in sight of my window, showing these three things. Probably over half of it seasons as straight as when it came from the saw, while other boards warp more or less.

A lumberman, not long since, gave me what looks like a reasonable explanation of this. He thinks that if the plank comes from the saw ranging from bark to heart, or what woodmen call *timber fashion*, it will not warp; but if the saw strikes the log *bastard fashion*, so that the edges of the plank range slab-wise, or from bark to bark, it will warp. This looks reasonable, and is certainly worthy of trial.

It is well known that for nearly a hundred years past the lumber yards and cabinet workshops of the North and East of our country, as well as those in some parts of Europe, have been supplied by the black walnut. The black walnut region is the entire area drained by the Ohio River, and with only scattering portions elsewhere. But it is nearly exhausted, and now that which is suitable for fine work commands very high prices. And there is no little inquiry as to what is to be done for the lack of the great American cabinet-making lumber. I do not hesitate to believe that sweet gum stands ready to take its place, with an article fully its equal in every respect, and with abundant supply.

It has been used a little of late years in a few yards and shops in Saint Louis, Louisville, Nashville, and other places, and the reason why those who have done so would hesitate or refuse to adopt this opinion is that they have not used the kind of gum that I allude to.

Sweet gum grows invariably on bottom land. Its natural home is the Mississippi alluvial land. But an inferior quality grows in the bottoms of rivers and creeks in upland regions. This may not be botanically different from that in the great bottom, but it is a different and very inferior tree. That found remote from the Mississippi, on the margin of creeks and rivers, has a short trunk, seldom over 30 or 40 feet, a large, spreading top, and the wood is nearly all sap. Frequently you will see a tree 2 feet in diameter, with a heart not over 3 to 6 inches in diameter; sometimes no heart at all, or not over an inch or two. This has frequently an eating grain, liable to curls and knots, always warps more or less, and sometimes it is very difficult to make it stay where it is put.

The gum of Yazoo bottom is a much larger tree, from 2 to 4 or 5, and sometimes 6 feet or more in diameter at the stump, with a very straight trunk, from 50 to 75 feet or more, without limb or knot, and with clear, smooth grain. The largest trees have generally the smallest sap. Frequently the large trees have not more than 3 or 6 inches of sap. The tree has a small top, generally a few large, short branches. If cut in summer, or early fall, when the sap is up, and left on the ground with the bark on, the sap portion soon perishes, but the heart, like cypress, will last, perfectly sound, in any wet, exposed condition, almost indefinitely. Properly handled, gum is among the most durable of Southern timbers, for either in or out-door purposes. It has been well tested.

CORNACEÆ.

CORNUS FLORIDA. (Flowering Dogwood.)

Along cliffs, ravines, and hill-sides throughout the State, and along ridges of the bottoms. On rich lands it attains a diameter of a foot. A valuable hard wood, of which large quantities are shipped from the Carolinas and Virginia to Europe for shuttles for looms. The bitter bark is used for a tonic in intermittent fevers.

NYSSA UNIFLORA. (Large Tupelo.)

Common in alluvial submerged swamps, especially near the coast. Often over 100 feet in height and from 3 to 5 feet in diameter. Frequent in cypress swamps. Wood white and soft and esteemed for making wooden ware. Foliage large and flowers beautiful.

NYSSA MULTIFLORA. (Black Gum.)

Common throughout the State in moist lands. Wood tough, hard to split, and used for wagon-hubs. Medium size tree.

CAPRIFOLIACEÆ.

VIBURNUM PRUNIFOLIUM. (Black Haw.)

Common on rich lands, and along streams and cliffs.

SAPOTACEÆ.

BUMELIA LYCIOIDES. (Ironwood; Southern Buckthorn.)

Grows in alluvial lands, but does not attain the size of a tree. Wood very hard.

EBENACEÆ.

DIOSPYROS VIRGINIANA. (Persimmon.)

Common throughout the State, and grows up quickly on fields not cultivated. In the forests of the Yazoo delta it is a good sized timber tree. Wood strong and durable. Fruit esteemed, and also used to make domestic beer. Improves with cultivation.

OLEACEÆ.

FRAXINUS AMERICANA. (White Ash.)

There are said to be six species of the ash east of the Rocky Mountains. Of these the white ash is the most important and valuable. It is abundant in the valleys on the rich slopes in Mississippi. The value of this tree for economic purposes is well appreciated farther north. It is used in the manufacture of farming implements, and for all purposes where lightness, strength, and elasticity are required. It is a beautiful tree, of rapid growth, and is being transplanted in the West. Also used in car construction by the Illinois Central shops, McComb City.

FRAXINUS VIRIDIS. (Green Ash.)

Common in low alluvial lands.

FRAXINUS PUBESCENS. (Red Ash.)

Observed as far south as latitude 33°. Grows to a large size in Mississippi bottom.

BIGNONIACEÆ.

CATALPA BIGNONIOIDES. (Catalpa.)

Has not been observed except in cultivation, but it is thought to be indigenous. It probably occurs wild in Northern and Eastern Mississippi. The Western catalpa (*Catalpa speciosa*) has probably been naturalized in some places in the western part of State.

LAURACEÆ.

SASSAFRAS OFFICINALE. (Sassafras.)

Common throughout the State. In rich lands it reaches the size of a large tree. Sprouts on sandy soil are hard to eradicate, and give trouble to the agriculturist. Roots are used for making a tea for "thinning the blood." Wood easily worked, durable, and made into "dug-outs" by Indians.

URTICACEÆ.

ULMUS FULVA. (Red, or Slippery Elm.)

Distributed throughout the State in alluvial soil. Bark used for medicinal purposes.

ULMUS AMERICANA. (White Elm.)

Common throughout the State, but of little value, except for shade.

CELTIS MISSISSIPPIENSIS, C. OCCIDENTALIS. (Hackberry.)

Both found in alluvial soil.

MORUS RUBRA. (Red Mulberry.)

Found throughout the State, in rich lands with a damp soil, but rarely, however, in northern portion. Sometimes 2 feet in diameter. Fruit esteemed.

MACLURA AURANTIACA. (Bois d'Arc; Osage Orange.)

Not indigeneous, strictly speaking, but sufficiently distributed to be classed among the natives. Formerly extensively used for hedges. Attains frequently a diameter of 1 to 2 feet. A most valuable wood for many purposes. Hard, durable, and stands the weather admirably. Leaves furnish food for silk-worms.

PLATANACEÆ.

PLATANUS OCCIDENTALIS. (Sycamore.)

Occurs in timbered bottoms. Planted for shade.

JUGLANDACEÆ.

JUGLANS NIGRA. (Black Walnut.)

Found to perfection in the rich Yazoo delta. Occurs sparingly in other portions. Wood very valuable, and fruit highly esteemed. Of easy rapid growth, and its cultivation would pay handsomely.

JUGLANS CINEREA. (Butternut.)

Found sparingly in extreme northern portion of State. Wood valuable.

CARYA OLIVAEFORMIS. (Pecan; Sweet Pecan.)

A beautiful and highly valuable tree, found in full perfection in the Mississippi bottom and the Yazoo delta. Wood useful and fruit very fine, commanding a highly remunerative price. The sweet nuts are rich and fine flavored. It is beginning to be cultivated, and every person with a rich soil, either upland or lowland, should plant pecan trees. Rev. George Whitfield, of Hinds County, has about one hundred and fifty trees, now twelve years old, bearing and promising a rich return. The nuts were planted and grew with little attention. Planted in yards and on lawns they produce beautiful shade trees and give a pleasing effect to surroundings. A good sized tree will not unfrequently bring an annual return of from $10 to $30. Their cultivation cannot be too strongly recommended. Trees have been found in the Yazoo delta 5 feet in circumference.

CARYA ALBA. (White Hickory; Shell-bark Hickory.)

Found extensively in rich alluvial lands in northern and central portions of State. Nuts are fine flavored and sweet. Wood prized for strength and durability.

CARYA PORCINA. (Pig-nut; Black Hickory.)

Occurs in a rich dry soil.

CARYA AQUATICA. (Water Hickory; Bitter Pecan.)

Attains a large size in Mississippi bottom and Yazoo delta. The wood is close-grained and strong.

CARYA TOMENTOSA. (White-heart Hickory; Big-bud Hickory.)

Common southward to the coast. Very much like *C. porcina*, with which it grows.

CARYA SULCATA. (Thick-shell-bark Hickory.)

Occurs in river bottoms.

CUPULIFERÆ.

QUERCUS ALBA. (White Oak.)

Grows extensively in rich loamy soils. Variable in form and size. It is one of the most valuable growths in the State. Wood used for cabinet-making, ship-building, cooperage, and in the manufacture of wagons, implements, &c. It is not rapidly reproduced, when once removed from the soil, and for that reason is liable soon to become scarce.

QUERCUS STELLATA. (Post Oak.)

Grows throughout the State. Small on thin lands, but large and well developed in rich soils. Grows extensively and to a fine size in the flat-woods. Wood heavy, hard, strong, and durable, and preferred for cross-ties for railroads, for posts, sills, &c.

QUERCUS CINEREA. (Upland Willow Oak; Blue Jack.)

Common on coast pine belt. It is said not to grow north of latitude 34°.

QUERCUS FALCATA. (Spanish Oak.)

Common on thin soils as a rather stunted growth, or medium size tree, but in the rich soils of the Yazoo delta it is a very large tree. Wood is considered very valuable, and used in ship-yards and railroad shops. Bark used for tanning, being considered equal to the mountain oak (*Q. prinos*) in this respect.

QUERCUS RUBRA. (Red Oak.)

Found extensively in low, cool, deep soil, not subject to inundation. Inferior as a wood to *Q. falcata*.

QUERCUS TINCTORIA. (Black Oak.)

Grows to a good size on hill-sides and near small streams. Prefers the uplands. Wood used for fuel and for wagon timber. Bark rich in tannin.

QUERCUS AQUATICA. (Water Oak.)

Frequent in low, wet soils, and of medium size. Also planted for shade. It is too small generally to be of great value for timber.

QUERCUS NIGRA. (Black Jack.)

A growth characteristic of the dry uplands. Valuable for fuel.

QUERCUS LYRATA. (Over-cup Oak; Swamp White Oak.)

Confined principally to northern and central portions of State, growing in a wet, damp soil. Wood quite as valuable as white oak, and hard, fine grained, and easily worked.

QUERCUS PHELLOS. (Willow Oak.)

Grows to a good size, and is quite common in the Yazoo delta. Planted for shade on the coast.

QUERCUS MICHAUXII. (Swamp Chestnut Oak; Cow Oak.)

Grows in a rich, damp soil, and not affected by occasional overflows. It attains a large size throughout the Yazoo delta. The large acorns have been used for food when roasted by Indians. It is one of the most valuable of the oaks. Used for making wagons by the White Oak Wagon Manufactory at Holly Springs.

QUERCUS VIRENS. (Live Oak.)

A beautiful ornamental tree. Wood also valuable. Quite common in southern part of the State. Timber used for ship-building, for which it is unsurpassed.

CASTANEA PUMILA. (Chinquapin.)

Found on hill-sides in the uplands. Of small size generally in this State. Specimens have been measured in Hempstead County, Arkansas, 4 feet in diameter. The fruit is highly esteemed, selling often from $3 to $6 per bushel.

CASTANEA VULGARIS, *var.* AMERICANA. (Chestnut.)

Found in northern and central parts of State, on hill-sides. Trees are frequently of very large size. Many fine trees have been destroyed for fruit. Most trees show signs of decay, and there is every indication that this valuable tree will soon be a thing of the past in this State. The fruit is much esteemed.

FAGUS FERRUGINEA. (Beech.)

Found quite plentifully in low, moist lands. Attains a diameter of 3 to 4 feet. It is believed to be a valuable wood, susceptible of a fine polish. The small nuts are highly relished by swine; are very fattening, and constitute altogether a very fine mast.

OSTRYA VIRGINICA. (Hop Hornbeam; Ironwood.)

Common on cliffs, hill-sides, and moist soils. Wood strong and durable.

BETULACEÆ.

BETULA NIGRA. (River or Red Birch.)

Found along streams in the northern and central portions of State. The sweet or cherry birch (*Betula lenta*) is said also to grow in the State.

SALICACEÆ.

SALIX NIGRA. (Black Willow.)

Common on rivers, creeks, and branches. Sometimes 3 to 4 feet in

diameter. Wood makes a fine charcoal, which has been used for making powder.

POPULUS MONILIFERA. (Carolina Poplar; Cotton Wood.)

Found extensively and of large size in the rich alluvial lands of the Yazoo and Mississippi bottoms. Also, sparingly along streams in other portions of State. Wood is now used to make cases for merchandise.

CONIFERÆ.

PINUS AUSTRALIS. (Long-leafed Pine; Yellow Pine.)

The celebrated "yellow pine" of the coast region ranks first in value and importance among the forest trees of Mississippi. This valuable growth extends as far north as to about latitude 32° 30′. The porous, silicious soils of the coast region seem especially favorable to its full development. Upon the best pine lands it is no uncommon thing to see from twenty to thirty large trees upon an acre, and, as elsewhere stated, as many as seventy trees have been counted on an acre. The trees will average on many acres 20 inches in diameter, running straight up to 40 or 50 feet without a single knot or blemish, and with a height of 75 and 100 feet. The wood is strong, compact, and durable, and is extensively used for ship building and car construction. The long timbers, suitable for ship building are much sought after, and bring high prices when exported to foreign ports. At the Illinois Central shops, McComb City, the yellow pine is used for the frames of both passenger and freight cars, and for this purpose is unsurpassed. Large quantities are daily shipped North to various car shops. There are many large mills located in the district, new ones are constantly being established, and the exportation of lumber has become a great industry, affording employment to many persons, and bringing a large amount of money to the State annually. A number of short railroads and tramways have been constructed to forests from eight to fifteen miles distant from the lines of transportation. The products of the mills find access to markets from Mobile, Ala., Pascagoula, Miss., Bay Saint Louis, Miss., New Orleans, La., and via. the Illinois Central, Louisville and Nashville, Mobile and Ohio, and Cincinnati, New Orleans, and Texas Pacific Railways. Immense quantities, at remunerative prices, are thus shipped to Saint Louis, Kansas City, Chicago, Louisville, Nashville, Cincinnati, Indianapolis, and other points in the United States, and to various European and South American ports. The production of naval stores, of turpentine and rosin, is extensively carried on in the pine region, at points contiguous to transportation facilities. This industry is especially prominent in Clarke and Wayne Counties. Many fine forests have been thus sacrificed to a single industry, but there is now greater care in boxing, so as not to destroy lumber trees and trees so small as to be injured in this manner. It is believed that the slabs, short ends, saw-dust, and other waste products of the mills will soon be utilized for the manufacture of turpentine by direct distillation. While the product obtained in this

way has been considered objectionable, it is believed that the process can be yet made practicable.

PINUS MITIS. (Short-leafed Pine.)

For valuable timber qualities this ranks next to the long-leaf pine. It begins in Central Mississippi, at the northern limit of long-leaf pine, and extends in a wide belt to the Tennessee line. It is largely mixed with the loblolly, or old field pine (*Pinus tæda*), and the various hardwoods. It is thus the principal supply of lumber in the region of mixed growths. The short-leaf pine prefers the clay soils of the hilly uplands, where it attains a height of from 50 to 75 feet, and a diameter of from 1 to 3 feet. It has short leaves, growing most frequently in twos, and yields, where the forests are thickest, 1,000 to 2,000 feet of lumber per acre. It furnishes the lumber for domestic purposes in the northern and central portions of the State, which is yellowish, hard, and, when made from the heart, lasting. It spreads rapidly, especially in worn-out fields, and is an important factor in the restoration of exhausted soils. It yields no resinous products. The loblolly (*Pinus tæda*) is, however, rich in resinous products, but with a sappy wood, quick to decay, and of inferior quality.

PINUS CUBENSIS. (Cuban Pine; Slash Pine; Swamp Pine.)

Along the low damp grounds of the coast, larger than the long-leaf pine, it succeeds the latter, and will be the timber of future generations. While not as highly esteemed as its neighbor, the long-leaf pine, it is notwithstanding a valuable growth, and is said to command an equal price at the saw-mill. The spruce pine (*Pinus glabra*) is also found in the coast region, sometimes of large size.

TAXODIUM DISTICHUM. (Bald Cypress; Black Cypress; Red Cypress.)

Grows extensively, and to a great size and height, in the sloughs, bayous, and inundated forests throughout the State. There are extensive cypress brakes in the Mississippi and Yazoo bottoms, where the tree reaches a diameter of 3 to 5 feet. It is the source of a great amount of lumber and shingles. The production of shingles has largely increased with the introduction of machinery, and is an industry of considerable importance in districts adjacent to the large cypress brakes. They range in price from $3.50 to $7 per thousand, according to quality. The manufacture of cypress shingles is carried on largely at Greenville and Vicksburg, Miss., and as the demand is constantly enlarging, it promises to be an industry of prominence in the State.

CHAMÆCYPARIS SPHÆROIDEA. (White Cedar; Juniper.)

Found on coast, and in the swamps of the Lower Tombigbee, in damp and submerged places. Wood easily worked, light, soft, and durable. A very valuable growth.